

VISTA_{pro}

User Manual

VISTApro

♦♦♦ *Vistapro* Notes ♦♦♦

VIRTUAL REALITY LABORATORIES, INC.

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Contents

Introduction to Vistapro	1-1
Notes on Vistapro	1-2
Vistapro String Gadgets	1-2
Vistapro on Accelerated Amigas	1-2
Vista Landscapes	1-3
Vistapro DEM Format	1-3
Vistapro Stack Requirements	1-3
Loading Vistapro from the CLI or a Shell	1-4
Limits of Vista's World	1-4
What is Vistapro?	1-4
How Vistapro Works	1-5
Some Uses for Vistapro	1-6
Speeding Up Vistapro	1-6
Making the Most of Vistapro	1-7
Lighting	1-7
Snow and tree line setting considerations	1-8
Foreground "fat polys" or "jaggies"	1-8
A note about aesthetics	1-9
Exploration with Vistapro	1-10

Vistapro User Manual2-1

Getting Started2-1

Floppy System2-1

Installation.....2-1

Making Working Copies2-1

One Drive Systems:2-1

Multiple Drive System:.....2-2

Renaming Your Working Copy2-3

Hard Disk2-3

Sample Session on Vistapro2-4

General Information About Vistapro.....2-5

The Vistapro Disks2-5

Vistapro Menus3-1

Project Menu3-1

Load3-2

IFF3-3

IFF 243-3

Save3-4

IFF3-4

IFF 243-4

RGB3-5

Load Landscape3-5

Vista DEM3-6

ColorMap3-6

Save Landscape	3-6
Vista DEM	3-7
Turbo Silver	3-7
ColorMap	3-8
Extended DEM	3-8
Print	3-8
About	3-8
Vista	3-8
Landscape	3-9
Quit	3-9
 Script Menu	 3-9
Create	3-10
Open	3-10
Add	3-10
Preview	3-10
Execute	3-10
 Anim Mode	 3-11
IFF	3-11
IFF24	3-11
RGB	3-11
VANIM	3-11
 Display Menu	 3-13
Low Res	3-13
Hi Res	3-13
HAM	3-13
Interlace	3-14
Overscan	3-14
Palette	3-14

Control Panels4-1

Upper Control Panel4-2

Target4-2

Camera4-3

Locking Functions4-4

dR4-4

dX4-4

dY4-5

dZ4-5

Bank4-5

Head4-6

Pitch4-6

Middle Control Panel4-7

Sea4-7

Tree4-8

Snow4-8

Haze4-9

Lake4-10

River4-10

Smooth4-11

Palet4-12

Waves4-12

Shadow4-12

Stars4-13

LockP4-13

Poly	4-14
Dithr	4-14
Rough	4-15
Scale	4-15
Main	4-16
Lens	4-16
Frac	4-16
Light	4-16

Lower Control Panels4-16

Main Lower Control Panel.....4-17

Blend	4-17
Gshade	4-17
PDthr	4-18
Render	4-18
Redraw	4-18
View	4-19
Abort	4-19

Lens Lower Control Panel4-20

Wide	4-20
Zoom	4-20

Fractal Lower Control Panel4-22

Random.....4-22

Island.....4-23

FrDim4-23

Frctlz4-24

Light Lower Control Panel.....4-24

NESW.....4-25

Custom4-25

Exager4-25

Azimth4-26

Declin4-26

The Vista Status Window5-1

X, Y, Z :5-2

Generate:.....5-2

Color:5-2

Cliffs:5-2

Shade:.....5-3

Sky:5-3

Horizon:5-3

Render:.....5-4

Color Control Panel6-1

Colors6-2

OK.....6-3

BW	6-3
Spread	6-4
Quit	6-4
Copy	6-4
Sound	6-4

Colors6-5

Sky	6-5
Cliff 1-4	6-5
Snow 1-4	6-5
Bare 1-4.....	6-5
Brush 1-4	6-6
Beach	6-6
Ocean	6-6
Water 5 - Waterfalls	6-6
Water 1-4	6-6
SkyHaze	6-7
Haze	6-7
Exposure	6-7
Contrast.....	6-7

Viewer7-1

Appendix A8-1

What are Fractals and Fractal Geometry?	8-1
--	------------

Appendix B8-4

The Landscapes	8-4
ElCap.scape:	8-4
HalfDome.scape:	8-4
CraterLake.scape:	8-5
MSHB.scape: and MSHA.scape:.....	8-5
Mons.scape:.....	8-6
Julia.scape: and Mandelbrot.scape:.....	8-6
Arrowhead.scape:	8-6
Vantage.scape:	8-7
SanLuisObispo.scape:	8-7
SanGorgonio.scape:	8-7
BigSur.scape:	8-7
MorroBay.scape:	8-8
MtBaldy.scape:	8-8
MtAdams.scape:	8-8
WoodSh.scape:	8-8

Appendix C8-9

Glossary of Terms	8-9
AI.....	8-9
Aliasing Artifacts	8-9
Caldera	8-9
DEM	8-9
Digi Paint.....	8-9
Digital Elevation Model	8-9
Dithering	8-10
Fat Polys	8-10
Fractal	8-10

Fractal Pro	8-10
HAM.....	8-10
Haze	8-10
IFF	8-11
Jaggies	8-11
Olympus Mons	8-11
Polygons	8-11
Ray Tracing	8-11
Topography	8-12
Topology	8-12
Turbo Silver	8-12
USGS	8-12
XYZ Coordinates	8-12

Appendix D9-1

Vistapro Tutorials9-1

I. Loading a DEM Landscape	9-1
II. Creating an Imaginary Fractal Landscape	9-2
III. Saving your Landscape	9-3
IV. Adding Rivers and Lakes	9-4
V. Scaling a Landscape.....	9-5
VI. Saving your modified Landscapes	9-6
VII. Setting Camera and Target Locations	9-7
VIII. Changing the Haze Level	9-8
IX. Test Rendering your Settings	9-8
X. Smoothing out Irregularities	9-8
XI. Blending, Gouraud Shading, and Dithering	9-9
XII. Setting the Light direction	9-10
XIII. Changing Colors	9-10
XIV. Saving your ColorMap	9-11
XV. Loading a new ColorMap	9-12

XVI. Rendering a Finished Picture	9-14
XVII. Saving Your Rendered Pictures	9-14
XVIII. Viewing Your Saved Pictures	9-15
XIX. Creating and using Animation Scripts	9-16
XX. Saving Turbo Silver Objects	9-18
 Index	 10-1

Introduction to Vistapro

Vistapro makes pictures of landscapes from two different types of data. Pictures of real landscapes are made from U.S. Geological Survey Digital Elevation Model data. The user can also explore billions of imaginary fractal landscapes generated from data produced by Vistapro itself. Starting with the control screen, you will notice a rectangular picture bordered by blue on the left two-thirds of the screen. This contains a topographical map of the landscape that you can explore. Vistapro's topographic map uses shades of green to represent the lowest altitudes, browns to represent the middle altitudes, and grey-whites for the highest altitudes. You can control Vistapro using the buttons on the right side of the screen.

To get acquainted with Vistapro, move the red crosshair to the Camera button and click the left mouse button. Note that the Camera button appears indented, which means the crosshair will now place the Camera (the small black square on the map) when you click the left mouse button over the topographic map. Note that the X, Y, Z coordinates within the boxes next to the X, Y, and Z buttons, change each time you click on a new Camera location. The Z coordinate shows the altitude of your camera. It is automatically set to 30 meters above the point that you clicked on. When you have your camera placed where you want it, add several hundred units to the Z altitude by clicking on the numerical value and putting in the new number. *Be sure to press return after entering the number, and don't click on the Z button itself, since this locks the Z into its initial position.* The extra altitude will put the camera far enough above the surface to reduce the size of polygons in the foreground. Next, click on the Target button, then click on the topographic map to place the target. Now a small + will appear on the map to identify the target location. The manual contains information on how to use all the other controls, but for now, please click on the Color button. This will cause the other control screen for Vistapro to appear. This screen is used for adjusting the colors, contrast, and brightness used to paint the landscape. Since this is merely a tour,

VISTA

don't change any of the settings. Click on OK at the bottom left part of the screen to return to the primary control screen. Using the right mouse button, go to the top left part of the primary control screen to view your pull down menus. Don't select any right now. Again, the manual describes their usage in detail. Click Render on the primary control screen and wait. *Vistapro* will render (draw and color) a rough (big polygon) view of the target you have chosen. After it has rendered the picture, a click on any part of the screen will return you to the primary control screen. Notice that the default Poly value is 8. This is the roughest and fastest view. It helps you quickly reset the camera view and lighting until you think you have it the way you want it. The lower Poly values increase the rendering time as they yield a more detailed picture. Now that you know your way around *Vistapro*, you may wish to take a few minutes to follow the tutorials. We designed the tutorials to teach by doing. When you have finished the tutorials, you will have an intuitive understanding of *Vistapro* which will increase your ability to use the program. The remainder of the manual is simply a reference text if you should want to know more about a particular feature.

Notes on *Vistapro*

Vistapro String Gadgets

To change a numerical value on any *Vistapro* control panel, you must hit the "return" key after typing the number. Simply entering the data will not cause it to change from the beginning value unless "return" is pressed.

Vistapro on Accelerated Amigas

The program selection "*Vistapro*" is for those who have standard Amiga 500's, 1000's or 2000's without an accelerator board. We optimized the program selection "*Vistapro.881*" for use with a 68020 or 68030 AND a 68881 or 68882 math co-processor. *Vistapro.881* will

NOT run without a math co-processor or on a 68000 based machine. Both programs are otherwise identical.

Vista Landscapes

All Vista Landscapes on the disk have the file protection mode set to 'read only'. This assures that you will not accidentally delete a landscape. The 'Protect' function on your Workbench will allow you to reset the protection. You may set 'Normal' protection by typing 'Protect <filename>.scape rwed' where <filename> is the name of the file you want to change. Do not type the "<" or ">" characters.

Vistapro DEM Format

If creating your own Vista DEM Landscape files interests you, you may get the Vista DEM format specifications from VRLI, 2341 Ganador Ct., San Luis Obispo 93401. Send \$5.00 to cover cost of postage and handling.

Vistapro Stack Requirements

Vistapro contains some recursive routines which may require large amounts of stack space. If *Vistapro* is run via its icon from the WorkBench, you needn't worry about the stack — it has already been set up in the *Vistapro.info* file. If *Vistapro* is run from a CLI or Shell, you must ensure that you run *Vistapro* with enough stack memory. From the CLI or Shell you can type "Stack" to see the current default stack setting. The usual default value is 4000 bytes. (The Lake function is the only function requiring much stack space. If you do not use the Lake function, you don't need to increase the stack beyond the 4000 byte default.) Otherwise, if the current stack setting is fewer than 30000 bytes, we suggest raising it. If it is very much larger, consider lowering it, especially if your machine is short of memory (see "Loading *Vistapro*" below). To set the default stack value to 30000 bytes, type "Stack 30000" from the CLI or Shell. *Vistapro* is now ready to use.

VISTA

Loading Vistapro from the CLI or a Shell

Before starting *Vistapro* from a CLI or Shell, be sure the default stack size is set to at least 30000. You can start *Vistapro* from any CLI or Shell by typing “*Vistapro*” from the directory where *Vistapro* is located. You can force *Vistapro* to load a particular landscape by including its device:path/name on the command line. Some possible examples:

Vistapro ElCap.scape

Vistapro df0:CraterLake.scape

Vistapro dh0:Vista/Landscapes/Mons.scape

You may, of course, simply type “*Vistapro*” and load a landscape via the “Load Landscape” menu items.

Limits of Vista's World

Hypercube Engineering created a fast mixed integer and floating point 3-D engine for use in *Vistapro*. *Vistapro* displays landscapes properly, when the Camera and Target are kept within -2000000000 and +2000000000 (on all three axis). Placing the camera or target outside this range or underground may result in distorted images, or no images at all.

What is Vistapro?

Vistapro is a 3 dimensional landscape simulation program. Using U.S. Geological Survey (USGS) DEM (Digital Elevation Model) files (available in Vista readable format from Virtual Reality Labs), *Vistapro* can accurately recreate real world landscapes in vivid detail. As a fractal landscape generator, *Vistapro* can create landscapes from a random seed number. Often these landscapes are more interesting than those found in the real world. *Vistapro* supports over 4 billion different fractal landscapes. Simply by changing a number, you can create whole new worlds. *Vistapro* is also a tool. Besides simulating real and imagi-

nary landscapes, it allows extraction of a certain amount of data from the DEM files. You can use the program output as an educational tool, as well as a research tool for the study of topography. In addition, by simply clicking on several buttons, you can create rivers and lakes in a landscape where none existed previously. *Vistapro* converts DEM files to Turbo Silver data which will enable you to import them into Turbo Silver or similar ray tracing programs to add stunning realism to ray tracings. For instance, you can add a house that you have worked on in a favorite rendering package to a real world landscape. Imagine being able to place an architectural creation on top of Mount St. Helens or on an island in the middle of a fractal landscape!

How *Vistapro* Works

Vistapro uses a combination of artificial intelligence, chaotic math, and a user definable set of values to simulate landscapes in their natural state. At present, the USGS has converted about 40% of the United States and its territories to DEM files which you can potentially use with *Vistapro*. *Vistapro* is a single frame generator, meaning that it acts like a camera; every time you point the camera and click, it will render a new view of the landscape. You can view Landscapes from a practically infinite combination of heights, angles, and distances. Using the combination of user controllable values and *Vistapro*'s built-in routines, you are able to make landscapes as realistic or as surreal as desired. It is easy to alter tree and snow lines, haze, exposure, rivers, lakes, and light sources to customize the appearance of the landscape. *Vistapro* uses United States Geologic Survey Digital Elevation Mapping files for generating its images. These files contain coordinate and elevation data at 30 meter (roughly 90 ft.) increments. Each file used in *Vistapro* contains about 65,000 elevation points and 130,000 polygons. *Vistapro* doesn't know anything about what covers the terrain. It doesn't know where the trees, roads or buildings are. It does its best to color each polygon (based upon a few numbers that you input) in a realistic way. It still can't draw each rock and tree.

Some Uses for Vistapro

Vistapro is not only of interest to scientists and engineers. Artists, writers, teachers, game designers, travelers, or people just looking for hours of entertainment will appreciate Vistapro. Artists can design realistic scenery as backgrounds for their artwork. Writers can create worlds and see them through their characters' eyes. Geography, geology, and meteorology teachers can use Vistapro to breathe life into their subjects. Game designers can make realistic or surrealistic scenery for backgrounds in their games. Travelers, hikers, and backpackers can preview their journeys. Vistapro can be pure entertainment. Explore fascinating terrains that you might never have a chance to see, or visit distant planets that man has not yet trod. Build new worlds that exist nowhere except in the imagination, and then visit them as if they were really there. On the other hand, there are many scientific and business applications for Vistapro. Environmentalists, surveyors, geologists, architects and engineers will all find Vistapro a useful adjunct to their work.

Speeding Up Vistapro

There are two ways to speed up Vistapro - strategy or brute strength. After you have used the program for a while, you will learn to "read" the lower resolution settings in Vistapro to see if you are obtaining the picture you want. When the scene is properly positioned and lighted, and when you have set the tree line, snow line, and water levels where you would like, then and only then, render the picture at the time-consuming full resolution mode.

The other alternative method of speeding up Vistapro's rendering process is to add power to your machine. We programmed Vistapro to use every available computing resource as efficiently as possible. The time consuming rendering process is a function of the enormous

amount of computation that *Vistapro* must do, not any lack of optimization of the program itself. *Vistapro* will automatically look for and use whatever processing resources you supply. When you add an accelerator board or upgrade to a faster machine, *Vistapro* will take advantage of the additional processing power without any adjustment or request on your part.

Realistic ray traced CAD objects, detailed 3-D animations, and realistic landscapes are all a part of the emerging software categories called virtual reality, artificial reality, or simulation. These categories all require immense computational capacity, but as the cost of computing power continues to plummet, these types of programs will become the standard. As a *Vistapro* user, you are pioneering virtual reality exploration and it is admittedly a bit tedious on an unaccelerated machine. But, looked at another way, it is amazing that this type of rendering can be done at all, let alone on a personal computer. Until the advent of *Vistapro*, landscape renderings of such realism were only available to users of workstations and supercomputers for secret government projects.

Making the Most of *Vistapro*

Making a stunning landscape in *Vistapro* requires the combined eye of a photographer and the artistic sense of a painter, but there are a few tips which can help improve your first attempts:

Lighting

Experiment with the lighting. If the light is coming from behind the camera, then the scene will be fully illuminated. You can create dramatic shadowing effects by choosing the proper lighting direction and angle. With the power of *Vistapro*, you can choose to light the scene in ways which could never occur in the real world, or, if you are a purist, you can select the correct solar position for that particular season and geographic location and time of day. Our Distant Suns

VISTA

planetarium program (or most other astronomy programs) can easily calculate such solar lighting conditions in order to correctly set the light, target, and camera position to obtain maximum realism in your rendering. If you just leave the lighting to chance, you may find that shadows cover your scene and it does not look good at all. We find that setting the light source (the sun) at 45 to 90 degrees to the left or right of the camera gives the best results. For example: if the camera is facing due north, placing the sun at the southeast, east, southwest or west, usually makes the best pictures. Placing the sun directly behind the camera usually results in a lack of three dimensionality and contrast, although there are times when this is the desired effect.

Snow and tree line setting considerations

If you know the normal range of snow line for the season that you are viewing and at what altitude the tree line begins, you can use *Vistapro* in a very realistic way. Tree line varies with latitude until, in arctic regions, it reaches sea level. Snow levels vary with the weather and altitude. A little research at the local library or even listening to the weather on the evening news will allow you to increase the realism in *Vistapro* landscape rendering. Of course you needn't follow the real world as an example. You are free to set the tree and snow lines wherever you want.

Foreground "fat polys" or "jaggies"

Since the accuracy of the data limits the detail that *Vistapro* can display, some of the foreground features will contain "fat polys" or "jaggies." *Vistapro* builds all images with polygons - - tens of thousands of polygons per scene. Far fewer polygons compose the foreground which is why they are larger. Obviously, as polygons get closer to the camera, they grow larger.

One of the easiest ways to overcome this problem is to use the "Zoom" function and move the camera farther away. But, since the Zoom function also narrows the field of view, and changes the three dimen-

sional perspective, it is not necessarily going to produce the desired image. A second quick method to reduce foreground polygons is to select a camera altitude several hundred meters above the local surface of where you have set your camera position.

A third method of hiding “fat polys” is to use Gouraud shading. This blends the edges of the polygons with each other, eliminating the sharp color change from one polygon to the next, and providing a beautiful artistic interpretation of the scene. This shades even very large foreground polygons into oblivion.

Finally, if you have a particularly critical need for a certain viewpoint, and you don’t want to use Zoom or a much higher altitude, you can experiment with altitude and with moving the camera very slightly forward to clear local obstacles. If you still have something in the foreground which you would like to remove, you may wish to export the picture to Turbo Silver or an art program in order to pull out or modify the unwanted features.

A note about aesthetics

Remember, there is no more a “right” way to use *Vistapro* than there is a “right” way to use a camera. A child using a camera or *Vistapro* may derive a lot of knowledge and entertainment from a result which would not please a more professional artist. Like the natural world it imitates, *Vistapro* gives the artist an unlimited number of choices for portrayal. What looks great to one person may not appeal to the next.

Fractals imitate the way nature looks, but they are not the same. They have no knowledge of geology, plate tectonics or erosion. So, whatever pictures you produce with *Vistapro* will be interpretive because *Vistapro* is producing an artificial reality to begin with. The philosophical and aesthetic ramifications of virtual reality construction are immense. *Vistapro* is an early forerunner of a medium of art and expression, as powerful and unique as photography for creative work.

VISTA

For many years after their introduction, photographs sparked lively debate about whether they were “art.” Computer art and virtual reality simulation seem destined to foment a similar debate in the future.

Exploration with Vistapro

As a virtual reality simulator, *Vistapro* allows you to explore landscapes you will probably never be able to explore first hand. We hope that most of you will have the opportunity to visit a few of the national parks, but, it is highly unlikely that any of us, except those who are now children, will have the chance to tour the caldera of Mons Olympus on Mars. As we are able to convert more of the data already available from planetary probes and undersea explorers, *Vistapro* will allow you to explore forbidding and alien landscapes decades, or even centuries, before the first human explorer is able to take tourist snapshots. By giving its users the ability to wander about distant landscapes, rendering true perspective pictures of their choice, *Vistapro* and later progeny will free humanity from its current boundaries long before such explorations are commercially feasible.

Vistapro User Manual

Getting Started

First make a backup of the Vistapro disk(s), following the instructions in the AmigaDOS users documentation that came with your version of AmigaDOS.

Floppy System

Installation

Before running Vistapro for the first time, you should make a working copy of the Vistapro Program disk. If you lose the copy, then you will still have the original.

Making Working Copies

These next few steps are here for the beginner, but you may use any of the Public Domain or Commercial Disk back-up programs you feel comfortable with to make a working copy of Vistapro. IF YOU HAVE ANY PROBLEMS, PLEASE READ THE AMIGADOS MANUAL THAT COMES WITH THE MACHINE ON HOW TO DO BACK-UPS.

One Drive Systems:

1. Insert Vistapro into the disk drive.
2. With the mouse, click on the Vistapro Icon with the left button once.

VISTA

3. Now press and hold the right mouse button down and select Duplicate from the *project* menu in the upper left hand corner of the Workbench screen.
4. AmigaDOS will prompt you with a Continue/Cancel requester.
5. With the left mouse button, press Continue.
6. Next AmigaDOS will prompt you to insert *Vistapro*. With the left mouse button press Continue.
7. The disk drive light will come on, and the drive will spin for a while.
8. After a while, a requester will pop up and ask for the destination disk. Insert the disk; this should be a blank.
9. Your Amiga will prompt you to insert the source disk. Then AmigaDOS will ask you to insert the destination disk. AmigaDOS may repeat this process several times, depending upon how much memory you have in your Amiga. When you are finished, put the original copy of *Vistapro* in a safe place.

Multiple Drive System:

1. Place *Vistapro* in one of the drives and the destination disk in one of the other drives.
2. With the left mouse button, click on the *Vistapro* disk icon and hold it down.
3. Next, drag the mouse, with the left button down, over the disk icon where you want to place your copy of *Vistapro*. Once the *Vistapro* icon is over the destination disk, release left mouse button.
4. If you have a Workbench or a hard disk, the copying will start. If not, AmigaDOS will ask you to put the Workbench disk back in a

drive for a few seconds, so that the system can read the disk copy command.

5. Follow the requester boxes, and in a minute or so you will have a working copy of *Vistapro*.
6. When complete, put the original copy of *Vistapro* in a safe place.

Renaming Your Working Copy

The next step is to rename the working copy. If a good working copy has been made, the disk should read 'copy of *Vistapro*'.

1. Click on 'copy of *Vistapro*' disk icon once with the left mouse button.
2. Now press and hold the right mouse button down while selecting Rename from the Project menu in the upper left hand corner of the Workbench screen.
3. Next, a small window will open in the middle of the screen and the name 'copy of *Vistapro*' should appear in it.
4. Press the DEL key until the 'copy of' is gone. Make sure to delete the space before *Vista*.
5. Now press return. In a second, the *Vistapro* icon should read '*Vistapro*', NOT 'copy of *Vistapro*'.

Hard Disk

There is a hard disk installation script on the *Vistapro* disk. To use it, you must have booted from a complete Workbench, not from the *Vistapro* disk. Just double click on the Install icon and answer the questions as they come up. Alternatively, you can double click on the *Vistapro* disk icon, and drag the *Vistapro* and Landscape icons into the drawer on your hard disk where you want to keep them.

General Information About Vistapro

The Vistapro Disks

On the *Vistapro* disk you will find two copies of *Vistapro*, a copy with the name “*Vistapro*”, and a copy with the name “*Vistapro.881*”. There is an install script called “Install HD” for hard disk installation. Also there is a “Read Me” file for additional information that is not included in this manual. You will find several Vista Landscapes in a drawer called Landscapes. On a second disk, named ‘Landscapes’, you will find several additional Vista Landscapes for use with *Vistapro*. *Vistapro*’s landscapes are identical in format with Vista landscapes, and can be used by both programs.

Vistapro Menus

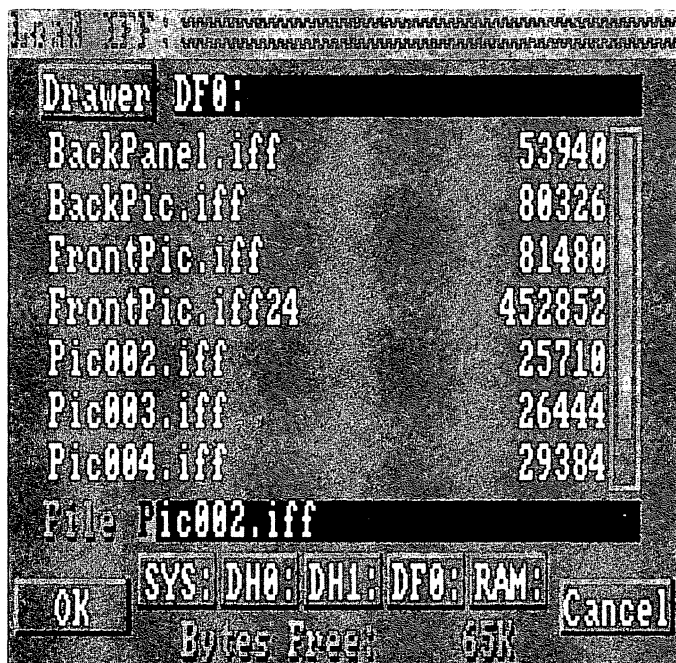
If you are not familiar with the way that you use menus on the Amiga, simply click on the right mouse button when *Vistapro* is displaying the control screen. This will show a title bar at the top of the screen. Keep holding down the right mouse button and move the crosshair to one of the two selections in the titlebar. Continuing to hold down the right mouse button, drag it down the menu. You will notice that it illuminates various selections or causes another sub-menu to appear. Continue holding down the button, until you illuminate your choice. Release the button to select that choice.

There are three main menus in *Vistapro*: the Project Menu, which controls loading, saving and printing, the Script Menu, which controls script creation and execution, and the Display Menu, which controls the different resolutions that are available with *Vistapro*.

Project Menu

Note — Many of the following menus involve the use of the *Vistapro* file requester. The file requester contains a space to enter the name of the drawer where you keep files of the given class, (ie. the Landscape drawer for landscapes, or the Pic drawer for IFF images) a window containing a partial listing of the contents of that drawer and a scroll bar to the right of the window for scrolling the contents of the window, a space for the name of the file you are dealing with, and a list of common device names where you are likely to find the drawer. (ie. DF0:, DH0:, RAM:)

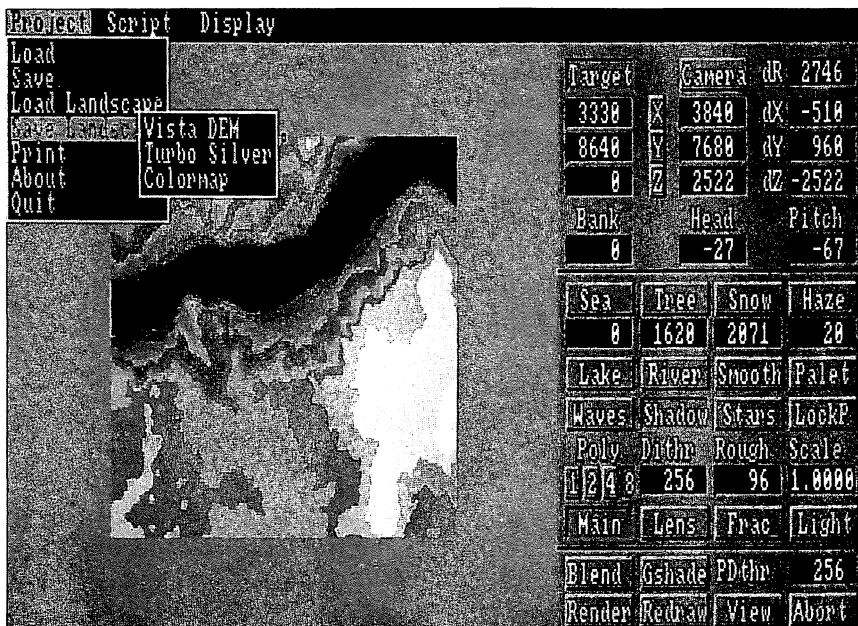
VISTA



Vista File Requestor

Load

The Load Menu Item allows you to Load and Display a previously saved Vistapro Image File. The Drawer name will be the name of the drawer in which you have saved IFF images, and the Device will be the disk where you will find this drawer. On a single floppy system, the drawer name will contain the name of the disk, followed by a colon ':', followed by the name of the drawer where you will find the images, ie. MyDisk:Pics.



Vista Menus

IFF

The 'Load, IFF' Submenu Item loads standard Amiga IFF files, and IFF HAM files, regardless of resolution.

IFF 24

The 'Load, IFF 24' Submenu Item loads Amiga Commodore standard 24 bit IFF files, regardless of resolution. They must be no more than 768 pixels wide or 484 pixels tall. Smaller images will simply be loaded towards the top left corner. After loading the 24 bit image data, Vistapro will draw the image to the display screen at the current display settings.

VISTA

Save

The Save Menu Item allows you to save an image that you have rendered as an IFF Image. The Drawer name will be the name of the drawer in which you want to save IFF images, and the Device will be the disk where you will find this drawer. On a single floppy system, the drawer name will contain the name of the disk, followed by a colon ':', followed by the name of the drawer where you will find the images, ie. MyDisk:Pics

IFF

The 'Save, IFF' Submenu Item saves in standard Amiga IFF format, using the current settings of the display menu. You can load these images into paint programs such as DPaint III for non-HAM renderings, and DigiPaint 3 for HAM renderings. The picture that is saved is the one that is currently on the 'View' screen. This is usually the scene that has just been rendered or redrawn.

IFF 24

The 'Save, IFF 24' Submenu Item saves in Amiga 24 bit IFF format, with hi-res, interlace and overscan. You can change this format using The Art Department, and display the images on the HAM-E board. The HAM-E board is the only 24 bit board other than the Mimetics Frame Buffer available at press time for this manual, so it is impossible to determine compatibility with other boards such as the Video Toaster and the Firecracker 24. Their manufacturers claim 24 bit IFF compatibility with their boards, so they should be able to use our IFF 24 bit output.

RGB

The 'Save, RGB' Submenu Item saves the Rendered image in the format output by Sculpt-Animate 4D. *Vistapro* produces only 746x484 pixel files. They are given the base-name supplied by you with ".ored", ".ogrn", ".oblu" extensions used by the Mimetics framebuffer program, version 1.01. For example, if you select PIC as the base picture name, *Vistapro* will produce: Pic.ored Pic.ogrn Pic.oblu

In order to allow for maximum flexibility, *Vistapro* does not have direct support for any particular framebuffer. What it has is the ability to execute an AmigaDOS control file after generating each frame of an animation. *Vistapro* passes the name of the data file just produced (IFF, IFF24, or RGB formats) to the scripting function. The control file can run whatever programs you want to process the picture. For example, for the Mimetics framebuffer, you can run the Mimetics Framebuffer program in command-line mode to "encode" the picture and then delete the file. .k FILE/a c:fbuf -e <FILE> c:Delete <FILE>.ored c:Delete <FILE>.ogrn c:Delete <FILE>.oblu

If you have a single-frame recorder, you could send a command to step the recorder, etc.

Load Landscape

The Load Landscape Menu Item allows you to load a Vista DEM landscape file or Vista Colormap header. The Drawer name will be the name of the drawer in which you keep your landscapes or ColorMaps, and the Device will be the disk where you keep this drawer. On a single floppy system, the drawer name will contain the name of the disk, followed by a colon ':', followed by the name of the drawer where you keep landscapes or ColorMaps.

VISTA

Vista DEM

The 'Load Landscape, Vista DEM' Submenu Item allows you to select a Vista DEM Landscape file into *Vistapro*. This can be a landscape that comes on the *Vistapro* disk, a landscape that you have previously Saved, or a landscape from a Vista expansion disk. Note that the Landscapes that come with *Vistapro* and those that are on the Vista expansion disks are write protected, to avoid the possibility that they will accidentally be overwritten by a 'Save Landscape' command. To unprotect these images, (you probably will never need to do this) at the CLI or SHELL prompt, type 'Protect <landscape>.scape rwed', where you replace <landscape> with the name of the landscape you want to unprotect.

ColorMap

The 'Load Landscape, ColorMap' Submenu Item allows you to load an existing ColorMap onto a landscape that you have already loaded. This does not affect the Landscape DEM data in memory, just the Color Palette information. You can load a ColorMap from another Vista DEM Landscape file, or from a Vista ColorMap file that you have saved previously.

Save Landscape

The Save Landscape Menu Item allows you to save a Vista DEM Landscape file, a Vista Colormap header, or a Turbo Silver Object file. The Drawer name will be the name of the drawer in which you keep your Landscapes, ColorMaps, or Turbo Silver Object files, and the Device will be the disk where you keep this drawer. On a single floppy system, the drawer name will contain the name of the disk, followed by a colon ':', followed by the name of the drawer where you keep Landscapes, ColorMaps, or Turbo Silver Object files.

Vista DEM

The 'Save Landscape, Vista DEM' Submenu Item allows you to save a randomly generated fractal landscape as a Vista DEM Landscape file. This file will not contain surface features such as lakes and rivers. This will save the ColorMap now in effect, along with the landscape.

Turbo Silver

The 'Save Landscape, Turbo Silver' Submenu Item allows you to save the current landscape as a Turbo Silver Object file. Unlike Vista 1.0, *Vistapro* saves landscapes as Turbo Silver Objects at all levels. This is because *Vistapro* saves a landscape as a series of Turbo Silver Objects, rather than a single one. *Vistapro* saves landscapes at all polygon sizes. *Vistapro* must complete at least the coloring and Cliff phases of the rendering process. After rendering has passed the Cliff portion of the process (displayed by the status window at the bottom of the screen), you can abort the rest of the process by clicking the left mouse button on the Abort button. In this manner, you can save a landscape as a Turbo Silver object with the proper coloring.

When you select the 'Save Landscape, Turbo Silver' Submenu item, *Vistapro* will draw an eight by eight grid over the topographic portion of the screen. You can then select a portion (or all) of the landscape by clicking with the left mouse button on the upper left hand corner of the area that you want saved as a Turbo Silver object. At this time you will see a 'rubber band' box appear, and you need to position the mouse to the lower left hand corner of the area you want saved. This is the area within the box. You then click again with the left mouse button.

Please note that these Turbo Silver objects are of extreme complexity, and will require a good deal of memory to render when using Turbo Silver. A polygon sized 2 landscape will require at least 7 megabytes of memory to render with Turbo Silver, and a complete polygon sized 1 landscape will require more than 30 megabytes. We suggest that you clip only the regions that you actually need, in order to save memory, or render at a larger polygon size (lower resolution).

VISTA

ColorMap

The 'Save Landscape, ColorMap' Submenu Item allows you to save the current Color Palette settings as a Vista ColorMap. This does not save the DEM Landscape data, and results in *Vistapro* saving a much smaller file. You may want to keep several different ColorMaps around, so that you can quickly load them into any landscape.

Extended DEM

Vistapro now has an extended DEM format which allows you to save all the current settings of the program along with the DEM data. This data includes colors, shades, camera and target positions, script mode, haze level—virtually every setting in the program. This is useful when continuing an aborted animation. Extended DEM files range from 300KB to 400KB bytes each.

Print

The Print Menu Item allows you to export Vista renderings directly to your printer. This prints whatever is on your View Screen, so you can use Load IFF to load an image into memory, and use Print to send it to the printer if you want to do so.

About

Vista

The 'About, Vista' Submenu Item tells you about the program *Vistapro*, the authors, and the publishers.

Landscape

The 'About, Landscape' Submenu Item tells you about the landscape, including the file name, the landscape name, and any comments about the landscape. This information comes from the header contained at the beginning of Vistapro's Landscape files. If you generate a fractal landscape, and save it, the header will contain information about the fractal setting used to generate the landscape, which you can use for your own future reference.

Quit

The Quit Menu Item closes down Vistapro and returns you to the Workbench.

Script Menu

The scripting controls allow creation of multiple unattended views of a landscape. The scripts are lists of camera and target positions, and are landscape independent. You can use the same script for several different landscapes, or you can change the settings for the current landscape re-executing the script. Script control allows changes to be made to the landscape without having to rebuild the script every time. For instance, if you want to change the light source direction, or if you want to see a landscape from several views with and without water, all that you have to do is make the appropriate changes and execute the proper script. Scripts can only control the position and orientation of the camera, (and by implication, the target) at this time. You cannot control any of the other settings of the program from within a script.

Note: Many of the following menus involve the use of the Vistapro file requester. The file requester contains a space to enter the name of the drawer where you keep files of the given class, (ie. the Script drawer for anim scripts, or the Anim drawer for IFF images) a window containing a partial listing of the contents of that drawer and a scroll bar to the right of the window for scrolling the contents of the window, a space

VISTA

for the name of the file you are dealing with, and a list of common device names where you are likely to find the drawer. (ie. DF0:, DH0:, RAM:)

Create

The Create Menu Item allows you to make a new Script. If you select Create, *Vistapro* will display a file requester, from which you can select the Device where you want to save the Script, the Drawer you want to put the Script in, and the Name of the Script. If you attempt to create an existing file, *Vistapro* will overwrite that file.

Open

Open will retrieve a previously created file for appending new frames.

Add

Add will append the current camera and target positions to the script.

Preview

The Preview Menu Item allows you to see the path that your Script will follow along the topographical map. If you are doing a continuous loop type of animation, it will show you if you have successfully closed the loop.

Execute

Execute will cause *Vistapro* to invoke the current script, creating a picture for every frame in the script file. *Vistapro* issues a prompt for a 'base' picture file name. It saves pictures as the base name, plus a 3 digit number. For instance, if you supply Pic as the base name, *Vistapro* will save the pictures as Pic.000, Pic.001, Pic.002, and so on.

Anim Mode

IFF

In IFF mode *Vistapro* produces an IFF file in the selected display format for each frame. It then spawns the “Execute” program to execute an AmigaDOS script (filename = DoFB.iff) which can do whatever you want.

IFF24

In IFF24 mode *Vistapro* produces a 24 bit IFF file. It then spawns the “Execute” program to execute an AmigaDOS script (filename = DoFB.iff24) which can do whatever you want. *Vistapro* displays the frame in lo-res/ non-interlace/ non-overscan format so you can see what you are generating.

RGB

In RGB mode *Vistapro* produces 24 bit RGB files as used by the Mimetics framebuffer program. It then spawns the “Execute” program to execute an AmigaDOS script (filename = DoFB.rgb) which can do whatever you want. *Vistapro* displays the frame in lo-res/non-interlace/ non-overscan format so you can see what you are generating.

VANIM

Vistapro does not have direct support for the Amiga’s standard ANIM format. You must use some other ANIM file generator to convert *Vistapro*’s IFF files into ANIM files.

Vistapro does have direct support for our own proprietary animation format (Vista ANIM, or VANIM). Our format has both benefits and drawbacks.

VISTA

The benefits are:

- 1) VANIM animations limit you to available disk space, not memory size. If you have a 800MB disk you can play an 800MB animation.
- 2) Each frame has its own color palette.
- 3) You can play animations backwards, or forwards, single-stepped, jump-stepped, etc.

The drawbacks are:

- 1) The animation files are larger than the regular Amiga ANIM format; about 2x as large.
- 2) Playback of animations with large frame sizes is slow, as little as 2 frames a second.

Vistapro always produces a file with a list of the picture names that it generates. The name of this file is PICBASE.list where PICBASE is the base picture name selected by you when you started the animation script. For example if you select DH0:ANIM/PIC as the base name, Vistapro would produce a sequence of pictures with the following filenames:

DH0:ANIM/PIC000
DH0:ANIM/PIC001
DH0:ANIM/PIC002

and the file DH0:ANIM/PIC.list would contain those full names. This is the format used by the popular MakeAnim program. If you are creating an animation in RGB mode, the filenames would be:

DH0:ANIM/PIC000.ORED
DH0:ANIM/PIC000.0GRN
DH0:ANIM/PIC000.0BLU
DH0:ANIM/PIC001.ORED
DH0:ANIM/PIC001.0GRN

DH0:ANIM/PIC001.OBLU
DH0:ANIM/PIC002.ORED
DH0:ANIM/PIC002.OGRN
DH0:ANIM/PIC002.OBLU

Display Menu

Low Res

Low Res sets the width of the Vista Image to 320 pixels, unless Overscan is also selected, in which case it is 384 pixels. This mode allows for 32 different colors to be used to draw the display. Pixel dithering can be used to increase the apparent color resolution and to add texture to the image.

Hi Res

Hi Res sets the width of the Vista Image to 640 pixels, unless Overscan is also selected, in which case it is 768 pixels. This mode allows for only sixteen colors to be used in drawing the screen. Pixel dithering can be used to increase the apparent color resolution.

HAM

HAM stands for Hold and Modify, a means by which you can simultaneously display many more colors than the Amiga can normally support. HAM mode is always Lo Res, and is hence 320 pixels wide, unless Overscan is also selected, in which case it is 384 pixels. HAM works in both interlace and non-interlace modes. In HAM mode, up

VISTA

to 4096 colors can be displayed simultaneously. Pixel dithering can still be used, but it may not improve the image.

Interlace

Normally an NTSC monitor displays the odd scan lines followed a 30th of a second later by the even scan lines. In non-interlace mode, the Amiga displays the same data for both the odd and the even lines, giving an effective vertical resolution of 200 pixels, except with Overscan where the resolution is always 242 pixels in non-interlace mode. In interlace mode, all 400 scan lines contain different data, giving a resolution of 400 pixels in the vertical direction, except with Overscan where the resolution is always 484 pixels in interlace mode.

Overscan

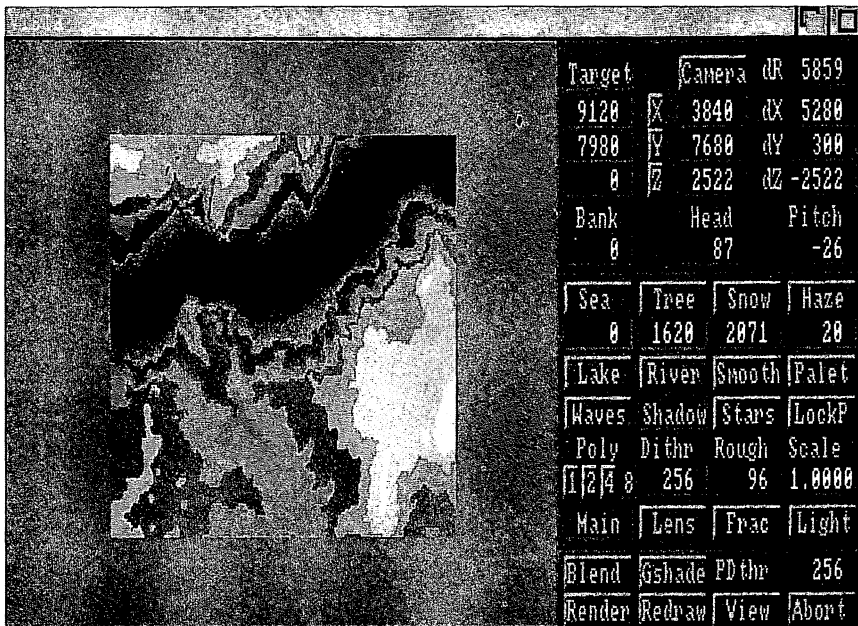
Normally the width of an Amiga screen is 320 pixels in Lo Res mode, and 640 pixels in Hi Res mode, and the height is 200 pixels in non-interlace mode and 400 pixels in interlace mode. With Overscan, the edges of the visible screen are also used, giving a Lo Res width of 384 pixels, a Hi Res width of 768 pixels, a non-interlaced height of 242 pixels, and an Interlaced height of 484 pixels. The outer edges of the image will not be visible, since they are in the far overscan region. This mode is similar to what you usually see on TV.

Palette

Selecting the Palette Menu Item displays and activates the Color Control Panel. See 'Color Control Panel' for further information.

Control Panels

The Vistapro Control Panels are split into three main sections, which we shall call the Upper, Middle and Lower Control Panels. In addition, there is a Color Control Panel that you can access with the Palette Menu Item in the Display Menu, or by clicking on the 'Palet' Button on the Middle Control Panel.



Control Panels and Topo Map

The map in the window represents the landscape area you loaded into Vistapro. The small "+" symbol on the map is the target. The small "□" symbol is the camera.

Upper Control Panel

Target		Camera	dR	7798
3840	X	3840	dX	0
0	Y	7680	dY	-7680
1170	Z	2522	dZ	-1352
Bank		Head		Pitch
0		-180		-10

Upper Control Panel

Target

The target represents the point at which you are aiming the camera. You can measure its location in meters from the lower left hand corner of the topographic map and in meters above sea level. By selecting Target on the Control Panel, you can place the pointer anywhere over the landscape and click the left mouse button, setting a new target position in the X and Y direction. The Z, or height value, changes with the elevation of the landscape. That is, the Z value in the Target represents the actual elevation of the landscape at that point. You may use this feature to find the elevation of the landscape at any given point. As an alternative, one can place the target precisely by entering

locations directly into the X, Y and Z value windows. To change a value, select the appropriate value window by clicking the left mouse button in the value window. Use normal editing techniques to change the window values. (Backspace, delete, etc.) You may also delete the entire contents of the window by using a combination of the right Amiga key and the X key. This works in all the value windows in *Vistapro*. Make sure to press the return key after entering a value, or *Vistapro* will not register the change. See also Locking Functions.

Camera

The Camera represents the location of a hypothetical camera used to take a scenic picture. You measure its location in meters from the lower left hand corner of the topographic map and in meters above sea level. The X coordinate is from left to right on the topographic map. The Y coordinate is from bottom to top of the topographic map, and the Z coordinate is in meters above sea level. Select Camera on the Control Panel. By placing the pointer anywhere over the landscape and clicking the left mouse button, you can select a new Camera position in the X and Y direction, and the Z or height value changes with the elevation of the landscape. The Z value in the Camera represents an elevation 30 meters above the landscape. Alternatively, one can place the Camera precisely by entering locations directly into the X,Y and Z value windows. To change a value, select the appropriate value window by clicking the left mouse button inside the value window. Use normal editing techniques to change the window values (backspace, delete, etc). Delete the entire contents of the window by using a combination of the right Amiga key and the X key. This works in all the value windows in *Vistapro*. Make sure to press the return key after entering a value, or *Vistapro* will not register the change. See also Locking Functions

Locking Functions

Other tools that you can use with both the Camera and Target functions are the X, Y and Z locks. You can use the locks when you want to restrain the target or camera from moving in one or more directions. For instance, if you are only interested in viewing the target while moving left and right (the X dimension), it is necessary to hold constant the Y value (up and down on the screen). You can hold the Y value constant by remembering the Y window value for the camera and re-entering it every time the camera moves, but it is far simpler to use the X, Y and Z locks. Select the lock from the three available on the Control Panel which restrains the target/camera in the desired dimension. As long as you keep this lock selected, *Vistapro* restrains both the target and the camera in that dimension.

dR

DR displays the distance in meters between Camera and Target. This distance is the radius from the target. You can use this value to 'step' closer to or away from the target - just as one might do when taking a photograph.

dX

DX displays the difference between Camera and Target X dimension values. The user can change this value by entering a new value in the DX value window. Changing this value moves the camera so that the correct distance and orientation between the camera and the target is maintained.

dY

DY displays the difference between Camera and Target Y dimension values. The user can change this value by entering a new value in the DY value window. Changing this value moves the camera so that the correct distance and orientation between the camera and the target is maintained.

dZ

DZ displays the difference between Camera and Target Z dimension values. The user can change this value by entering a new value in the DZ value window. Changing this value moves the camera so that the correct distance and orientation between the camera and the target is maintained.

The following descriptions use an airplane as a model to explain themselves. Using these three functions, one can add many new dimensions to the appearance of the landscape.

Bank

Bank controls the rotational angle of camera around its Y axis. Imagine an airplane floating in space. You can describe the Y axis as an invisible line drawn from the tail of the airplane, through the middle to the nose. Any rotation that causes one wing to dip and the other to raise is a rotation around the Y axis. A positive rotation around this axis would cause rotation in a clockwise fashion. The left wing would raise and the right wing would lower.

VISTA

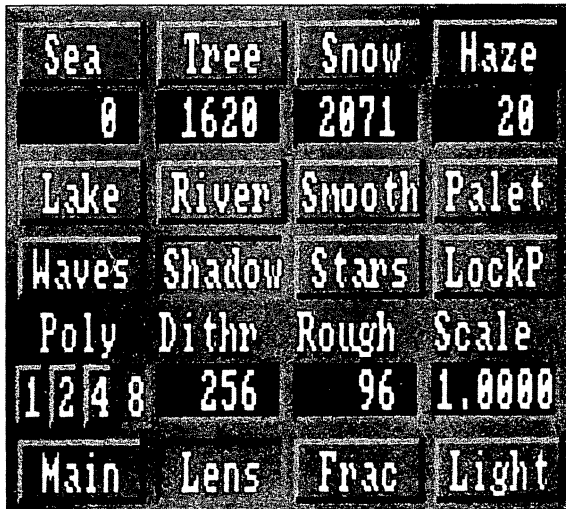
Head

Heading describes the rotational angle of the camera around its Z axis relative to the landscape. Imagine an airplane floating in space. You can describe the Z axis as a line drawn from the top of the airplane through its middle to its bottom. Any rotation around this axis causes the airplane to turn right or left. A positive rotation causes the airplane to turn right.

Pitch

Pitch is the rotational angle of camera around its wing axis relative to the landscape. Once again, imagine an airplane floating in space. A line drawn from the left side of the airplane through the wings to the right side, describes the wing axis. Any rotation around this axis causes the airplane to move the nose either up or down, with a positive rotation causing the nose to go up.

Middle Control Panel



Middle Control Panel

Sea

By setting the sea level, you can sink the landscape into the sea to that level. All points below this level become sea level (0 meters), and all points above this level have that value subtracted. For example, if you select 1000 meters as sea level, a point at 500 meters will sink to 0, 2000 meters will sink down to 1000 meters, 3000 meters will sink to 2000 meters, etc.

Vistapro will erase rivers and lakes (if present) when it generates a new sea level. Vistapro will need to color and shade the landscape again.

Vistapro has a button for selecting sea level. The user clicks on the Sea button and then selects the level by clicking on the topographic map.

VISTA

The user can still specify the level explicitly by typing into the appropriate box.

Tree

You can use the tree level to set the timber line (where the forest area ends) and to fine tune the image. Thus, the timber line is not a hard coded altitude. The AI rules try to compensate for landscape irregularities such as cliffs and valleys. If there is a cliff, the trees will not cover the cliff but will proceed around it, if possible, or they may skip it entirely, if the top of the cliff is above the tree line. If there is a valley, the tree line will extend upwards into the valley a certain distance, even though it may be above the original tree line. Since tree level is only an effect, and does not create actual trees, you may use it to describe any type of ground cover. For instance, you can change all tree colors to brown to give the landscape a more barren look, or to gray shades for a rocky appearance.

Vista*pro* has a button for selecting tree level. The user clicks on the Tree button and then selects the level by clicking on the topographic map. The user can still specify the levels explicitly by typing into the appropriate string gadgets.

Snow

The Snow Level is the lowest elevation in meters where Vista*pro* will cover the landscape with snow. The AI (Artificial Intelligence) rules in Vista*pro* use this value to calculate where to cover the landscape with snow, automatically compensating for cliffs, rivers and lakes. It will attempt to create a snow covering equivalent to that found in nature. If there is a cliff, the snow will not cover the cliff but will proceed around it, if possible, or it may skip it entirely, if the top of the cliff is below the tree line. If there is a valley, the snow line will extend down into the valley a certain distance, even though it may be below the original snow line. The user may also notice snow at the base of

steep cliffs and over the tops of rivers at their highest elevations. You can use the snow color to describe any type of ground cover. For instance, you could change all snow colors to brown to give the landscape a more barren look, or to gray shades for a rocky appearance. You can also use the snow function to embellish a mood by changing the snow color and setting a very low snow level, but because of the way that we designed the AI, it is often more desirable to use the tree level for ground cover effects. This is particularly true because of the way trees follow the valleys upwards and snow follows the valleys downwards. Select the Snow Level value window from the control panel. Changing this value will change the starting point for the snow line.

Vistapro has a button for selecting snow level. The user clicks on the Snow button and then selects the level by clicking on the topographic map. The user can still specify the levels explicitly by typing into the appropriate string gadgets.

Haze

In reality, the farther away an object is, the more atmospheric occlusion there is. The haze function allows imitation of this effect adding to the 3-dimensional 'feel' of the resulting image. You can modify the apparent density and color of the atmospheric occlusion by changing the 'Haze' color in the Colors window. (See colors.) Enter a value between 1 and 32 in the haze value window to change the density of the 'Haze'. 1 is the least amount of haze and 32 is the greatest amount of haze. Alternatively, the program can calculate the haze value automatically. Select 'Haze' on the Control Panel, and Vistapro calculates a new haze value as a function of the distance between the Camera and the Target. The farther apart they are, the lower the haze value. We tried to arrange it so that the haze first becomes apparent at the distance of the target from the camera, if you have selected the haze level using the 'Haze' button.

Lake

Lake Generation adds lakes to a landscape. Select 'Lake' on the Control Panel. Then, using the mouse, place the pointer on the landscape at the lake level desired, and click the left mouse button. Example: If one places the pointer in a shallow valley at 2100 meters, water will begin to fill the valley until it reaches the 2100 meter mark, as it would in nature. If there is any portion along the edge of the valley that is below the 2100 meter mark, water will spill out of the valley and begin to flood the landscape. This may not be the desired effect, and it should be kept in mind when using the Lake function. If there is uncertainty about the height of any portion of the landscape, select the Target and determine the height, clicking the left mouse button over the portion of the landscape in question. The value that shows in the Z button is the height of the landscape at that location. By checking the landscape quickly with the Target function, it is possible to determine the maximum safe altitude for the Lake function. Lake generation can be aborted and the landscape restored by clicking on the 'Abort' button while generating a lake. Any rivers that were overlaid by the lake will have been lost.

River

River Generation allows the addition of rivers to a landscape. A river, once generated, follows the landscape from the point of origin selected. It will always flow toward the next lowest point of the landscape available. If a river reaches a point in the landscape where there are no routes of escape, it will flood that portion of the landscape until it creates a new path to follow. It will leave behind lakes, until it reaches the edge of the landscape, or until you press the left mouse button. You can stop the River function at any time by clicking the left mouse button. Sometimes it is faster to fill spots with the Lake function before

attempting to use the River function, because the Lake function operates much faster. Select 'River' from the Control Panel, and using the mouse, place the pointer over the portion of the landscape chosen as the start of a river. Then click the left mouse button. Usually this will be some place obvious, like the head of a valley or a ravine on the side of a mountain, but you can choose any spot on the landscape desired, and start a river there. Sometimes a single pass of the River function will create a river that is very narrow and not highly visible from all angles. If this happens, repeat the river creation process as many times as desired. Each time, the river will gain some breadth, and become more visible.

River generation can be stopped by pressing the 'Abort' button. This will stop the additional flow of the river, but will not erase the part that has already been generated.

Smooth

The Smoothing function smooths or erodes the landscape, removing the harsher, more jagged edges of hills and mountains. Smoothing generally improves the appearance of landscapes, and it is especially useful when dealing with fractal landscapes. You should use the smoothing function sparingly with DEM files if data integrity is important, as it distorts data. Selecting Smooth from the Control Panel will invoke the smoothing function. This is a repeatable, refining function, meaning that it can be run over and over again, smoothing (eroding) the landscape more on each pass. Smoothing is also used to obtain snow covered peaks. Because of the design rules of the AI algorithms and as is also true in nature, it is very rare that the summits or peaks of mountains are completely snow covered. It is more often the case that due to the steep nature of the cliff faces and other contributing aspects, such as wind and snow weight, snow does not cover the peaks of most mountains. However, since it may be desirable artistically to create a completely snow-covered mountain, smoothing the mountains will often give this effect.

VISTA

Palet

You can select the 'Palet' Button to display and activate the Color Control Panel. See 'Color Control Panel' for more information.

Waves

Vistapro can generate waves within the sea. To enable this feature, select "Waves" from the main control panel. To deselect the waves feature, re-select the "Waves" button. When you enable waves, Vistapro will generate them along with any new sea that is generated. You can add waves to an already generated sea by selecting the 'Waves' function and setting a new sea level, or the same sea level (value 0). While Vistapro is generating waves, it displays a message on the status line.

Vista generates waves (if specified) only when a sea level is set, both on fractal and real-world landscapes.

Shadow

The Shadow button is normally selected and means that during image rendering, Vista will take the light source direction into account and will generate appropriate shadows. If for some reason you do not want shadows, you can de-select the Shadow button, and Vistapro will no longer generate shadows. The shading function runs more quickly if shadows are not generated.

Stars

Vistapro can generate stars in the night sky. To enable this feature, select the “Stars” button from the main control panel. To deselect the stars feature, re-select the “Stars” button. When you enable stars, Vistapro displays them in the sky whenever it renders a scene. Vistapro automatically changes the sky color to black, and changes the haze and sky-haze colors to dark shades. The star patterns are randomly generated and bear no resemblance to the real night sky as viewed from earth. Stars may not show up well in lo-res and HAM modes because of antialiasing.

Some recommended settings with stars enabled:

Item	Red	Grn	Blu
Sky	00	00	00
Haze	10	10	10
SkyHaze	10	10	20
Fade value (250)			

For a sundown effect:

Item	Red	Grn	Blu
Sky	00	00	30
Haze	10	10	10
SkyHaze	60	00	00
Fade value (250)			

LockP

The LockP Button locks the color palette. Normally, Vistapro generates the best color palette that it can for each image, based on the terrain it is rendering. This can cause some flickering in animations as the same areas slightly change color from frame to frame. By locking the color palette, you guarantee that the colors will be consistent

VISTA

between frames of an animation. When you select the 'LockP' button, the palette is locked at the current settings. You should generate a 'typical' frame before locking the palette to ensure that the palette contains a reasonable cross-section of colors.

Poly

Vistapro produces 131,072 polygons at its finest resolution. The Polygon Size function controls the relative coarseness of the landscape image. A size of 8 generates 1/64th as many polygons (1/8th on each axis) as a size of 1, and they are 64 (8 x 8) times as large. That is, a landscape can consist of 131,072 size 1 polygons, 32,768 size 2 polygons, 8192 size 4 polygons, or 2048 size 8 polygons. You can use the larger polygons to generate quick previews of landscapes. When you are happy with your camera and target placement, use smaller polygons. The smaller the polygons, the longer it takes to generate the image. The larger the polygon size number, the less detail that will show up in the image, because Vistapro is displaying only a fraction of the original data. The lower resolutions (higher poly number, i.e. 4,8) are useful for quick test renderings to check for landscape color, light placement, and exposure settings.

Dithr

The 'Dithr' Button sets the "fuzziness" of the division between color bands in Vistapro. A setting of 0 will make the tree-line and snow-line very sharp boundaries. The default setting of 128 gives a moderate amount of dithering of the colors. A large value like 1000 will make the colors so dithered that there is no visible relationship between altitude and color. To set this value, click the mouse pointer on the "Dithr" string gadget on the Main Control Panel. Change the number from the keyboard and press RETURN. Useful values range from 0 to 1000.

Rough

The 'Rough' Button sets the apparent roughness of the landscape when rendered. *Vistapro* accomplishes this by adding a scaled random number to the shade of each polygon, so that some of the polygons will be darker than normal and some will be lighter. To set this value, enter the color-control panel by selecting "Color" from the main control panel. Click the mouse pointer on the "Rough" string gadget. Change the number from the keyboard and press RETURN. Useful values range from 0 to 256. Very large roughness values result in unnatural shading.

Scale

The user can now vertically re-scale any landscape. Typing a number into the scale string gadget will cause *Vistapro* to scale the landscape as requested. For example, if you type in 2.0, *Vistapro* will stretch the landscape out vertically so that mountains are twice as tall, etc. Values between 0.0 and 1.0 will cause *Vistapro* to flatten the landscape. Values below 0 cause the landscape to flip over (valleys become ridges, mountains become pits) before *Vistapro* scales them. The number typed in always results in a landscape that is that value times the original landscape. The user can save landscapes after scaling.

You can generate some interesting effects with the scaling function. You can flip landscapes upside down by using negative values. Scaling mountains so that the top will exceed 32000 meters and then scaling it back down to normal will result in mountains with big pits or calderas. Scaling to very large values can even cause several layers of this effect resulting in a mountain inside a collapsed mountain inside a collapsed mountain. Scaling mountains down until they are very small and scaling them back up will result in stepped mountains.

VISTA

Main

The Main Button enables and displays the Main Lower Control Panel. See 'Main Lower Control Panel' for details.

Lens

The Lens Button enables and displays the Lens Lower Control Panel. You can use this to select the type of lens the Camera is using. See 'Lens Lower Control Panel' for details.

Frac

The Frac Button enables and displays the Fractal Lower Control Panel. You should use this when generating random fractal landscapes. See 'Fractal Lower Control Panel' for details.

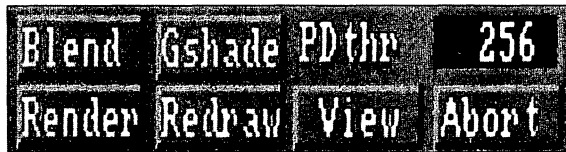
Light

The Light Button enables and displays the Light Lower Control Panel. You should use this when selecting the direction and intensity of the light source. See 'Light Lower Control Panel' for details.

Lower Control Panels

The Lower Control Panels consist of four separate Control Panels overlaid on a common space.

Main Lower Control Panel



Main Lower Control Panel

Blend

Blend helps reduce the coarse texture of distant parts of the landscape. If you select the 'Blend' button, *Vistapro* will draw each polygon with a weighted average color of that polygon and the three polygons that border it. This reduces the aliasing of distant polygons. It also reduces the color saturation of polygons, so its use is optional.

Gshade

Gouraud shading produces smooth-looking surfaces without obvious triangles. It requires about 50% more rendering time. Gouraud shading gives a brush like feeling to the landscape, as if an artist painted it using oils, rather than the Amiga playing with numbers. Besides filtering out large polygons, it adds mood to the landscape. The foreground may appear blurry with Gouraud shading.

VISTA

PDthr

Dithering at the pixel level increases the apparent number of colors in the display. *Vistapro* uses a dithering method which allows you to set the amount of dithering used within the display. It can be set anywhere from 'no dithering' to 'so much dithering you can no longer recognize the picture'.

Render

This starts the generation of a new picture using the current settings in the control panels. *Vistapro* performs several functions while rendering. It displays its progress at the bottom of the screen in a status window. For most functions, there is a continuously updated status count, so that you can monitor *Vistapro*'s progress. (See 'Vista Status Window' for more information.) You can abort the rendering process by pressing the abort button.

Redraw

The Redraw button redraws the image onto the View Screen in the current resolution/mode set by the Display Menu. This only works for the image last rendered, or 24 bit image you loaded with the 'Load, IFF 24' Menu Item. For example, if you just generated a picture in lo-res mode and decide that you would like to see it in hi-res mode, you can simply select the 'Hi-Res' Menu Item, and press the 'Redraw' button. It is not necessary to re-render the picture.

Vistapro uses two different algorithms for drawing in HAM mode. If the polygon size is set to either 4 or 8, it employs a crude but fast algorithm. When using HAM mode, more HAM artifacting is noticeable at these poly sizes. HAM artifacting is the colored 'spikes' that can

appear in a HAM image at sharp contrast transition boundaries. If the polygon size is set to 1 or 2, *Vista_{pro}* uses a more precise method, resulting in less HAM artifacting.

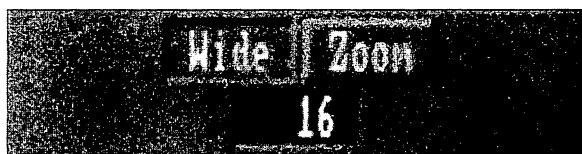
View

When the rendering is complete, *Vista_{pro}* automatically displays the image. If you have returned to the Control Panel, you can redisplay the image with the View button.

Abort

You can use the Abort button to stop the Rendering function, and River and Lake generation. With Lake generation, *Vista_{pro}* removes the lake from the landscape, which may result in the erasing of any River data that it overlaid when generating the lake. When generating a river, Abort simply stops flowing the river, it does not remove the part already generated. The Abort button may not appear to be pressed when you press the mouse button, but it will still be active, and will abort the current function.

Lens Lower Control Panel



Lens Lower Control Panel

The camera lens feature represents the lens type in a camera.

Wide

The wide angle lens is about the same as normal human vision. The wide angle lens is best for looking at large areas of the landscape while adjusting the tree line or the exposure setting to capture a general view of the landscape.

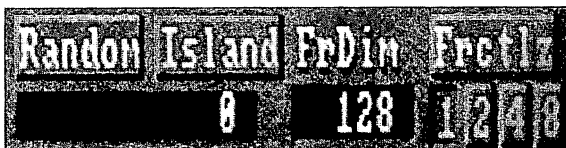
Zoom

The zoom lens is about 2 times the magnification of the wide angle lens and is best used once you have located an area of special interest. One of the advantages of using the zoom lens is that it helps to defeat the 'Fat Poly' artifacts found when using the wide angle lens for close up work. Fat Polys are those polygons in the immediate foreground which appear when using either lens for close up shots; they are an

artifact of the triangular structure of the polygons. These polys are everywhere throughout the landscape, but they tend to disappear a short distance away from the camera, as they all blend together to give a uniform shaded appearance. One way to defeat the 'Fat Polys' is that once you have located an interesting scene using the wide angle lens, you can increase the distance between the camera and the target, and switch to the Zoom lens. With this technique, the polygons are no longer right in front of the camera, and they blend together in the distance to give a much more uniform and pleasant appearance.

The Zoom value represents a relative magnification from the normal Wide angle camera lens. 'Normal' for the Wide lens is 16, and for the Zoom is 32. Lowering the lens value below 16 widens the angle of the lens, and raising it increases the amount of Zoom. The lowest valid value is 1. Values below 8 or so are generally impractical. The absolute limit at the high end is about 2,000,000,000 but such a high zoom value is generally impractical. The largest practical value is about 1/10 the distance from the camera to the landscape. For instance, if the camera is at an altitude of 1,000,000 meters above the landscape (be sure to turn down the haze!), a zoom value of 100,000 will make the center area of the landscape fill the picture.

Fractal Lower Control Panel



Fractal Lower Control Panel

Random

Random Landscape Generation allows creation of a vast number of completely artificial landscapes. *Vistapro* supports over four billion random fractal landscapes. Each different number in the fractal number window represents a different landscape. You can use negative numbers. Using a number such as -1,231,541 will create a different landscape than its positive counterpart 1,231,541. Select 'Random' on the Fractal Lower Control Panel. Notice that a new number has appeared in the random seed window. The software will then proceed to create a new landscape. After a while, depending on the speed of the system running the program, a new landscape will appear. If this landscape is one which you may want to use again, be certain to write down the number so that you can recall it again, or save the landscape, using the 'Save Landscape, Vista DEM' Menu Item. To recreate a desired landscape, simply reenter its number in the random seed window and *Vistapro* will create the same landscape again. This method conserves disk storage space much more efficiently than saving

the entire landscape as a DEM file, and is fast to load. Alternatively, enter any number desired into the random seed window and explore landscapes in this fashion. Various methods include using special dates such as birthdays (minus hyphens or slashes, ie. 52262 not 5-22-62), holidays and anniversaries. Keep a list of numbers for those landscapes that prove to be interesting so that you can share them with other owners of *Vistapro*. You can also save landscapes as DEM files once you have added your own colors, tree and snow values. Name some landscape features and personalize them with names of friends. Like the fingerprints of the four billion inhabitants of this planet, some *Vistapro* scenes may look similar, but, upon closer examination, each one is individual and distinctive.

Island

There are now two modes for generating fractal landscapes, Island and Floating. Island mode is similar to the *Vistapro* 1.0's method — the edges of the landscape are all at the same altitude so that they can be sunk (previously done automatically, now done via the SEA function) and turned into islands. In floating mode the edges of the landscape vary in altitude along with the interior. Floating mode generates landscapes that look like you clipped them out of a larger area — similar to the USGS DEM landscapes.

FrDim

The 'FrDim' Button controls the Fractal Dimension (roughness of the terrain) of the fractal mountains. To change the height, click the left mouse button inside the value window, and enter a new value. A normal value is 128. Any change from 128 will cause *Vistapro* to scale the mountains by the correct amount as it regenerates them. To regenerate the landscape, return to the control panel by selecting the 'OK' button. Then, select the random seed value window and hit

VISTA
return. This forces *Vistapro* to recreate the fractal landscape using the new Fractal Dimension.

Frctlz

You can fractalize existing landscapes to add additional texture to them. Use the current Polygon size setting to specify the width of the bumps and pits created. *Vistapro* uses the current Fractal Dimension to determine the roughness of the bumps and pits.

Light Lower Control Panel



Light Lower Control Panel

Light Source Direction is the direction from which the sun is shining, and you use it in combination with the exposure and contrast settings to determine the location and depth of shadows when generating an image. This function 'moves' the sun.

NESW

Select the desired light source direction by clicking on the North (N), South (S), East (E), or West (W) button on the Light Lower Control Panel. This represents a light source that is roughly 45 degrees high in the sky. Using these pre-programmed directions speeds up the scene generation during the shading phase if shadows are enabled.

Custom

The Custom Button allows you to have complete control over the direction and angle of the light source. Selecting this button causes a 'bullseye' to be drawn around the center of the topographic map, with a line radiating out from the center of the map to the current mouse position. This represents the position of the sun in the sky. Think of the line as a stick pointing at the sun from the center of the landscape. Since you are looking down onto the landscape from above, the longer the stick is, the closer the sun is to the horizon, and the shorter the stick is, the closer the sun is to being directly overhead. The stick points in the direction of the sun. When you have located the desired direction and angle, a single click with the left mouse button locks this in place. Using a custom light source increases rendering time during the shading phase, if shadows are enabled.

Exager

The 'Exager' (Exaggeration) button enables exaggerated shading. Imagine a ball in front of you, with a light shining on it from above. The top of the ball faces the light, and appears very bright. Points farther down the sides of the ball reflect less light and appear darker. Halfway down the side, the light no longer shines on the surface, and it is in shadow. Exaggerated shading increases the rate at which the shades darken around the sides of the ball. This technique can add detail to the image by exaggerating small irregularities on the land-

VISTA

scape. Vista 1.0 generated all images using this exaggerated shading. You will probably want to disable this function when setting the sun at low declinations, since the exaggeration makes all the flat areas appear very dark.

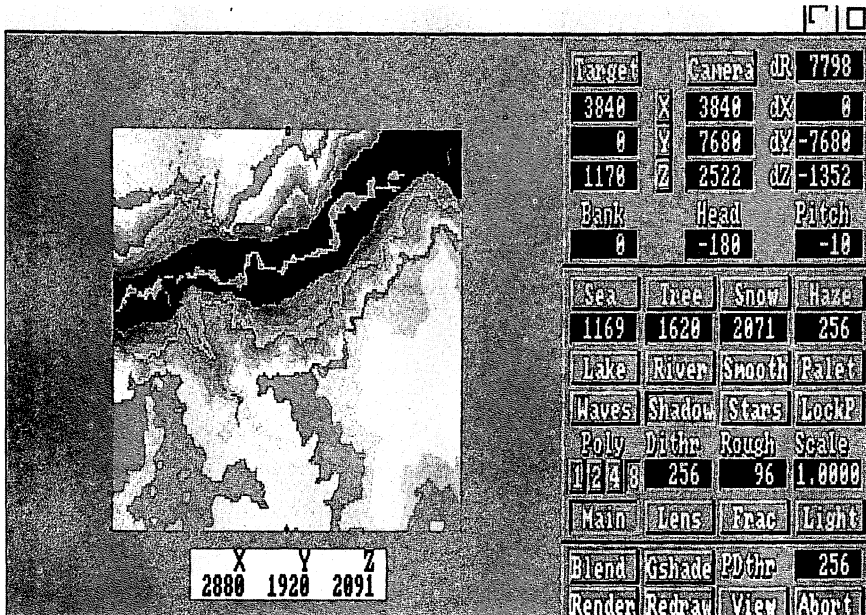
Azimuth

You can use the Azimuth button to set the direction in degrees from South of the light source. Zero degrees is due south, 90 degrees, due west, 180 degrees, due north and 270 degrees is due east. Note that this differs from the heading, which is measured from the due north, as is common in navigation.

Declin

You can use the Declin button to set the angle in the sky of the light source. Zero degrees means that the light source is on the horizon, while 90 degrees means straight overhead. This is similar to the way Pitch is measured for the camera.

The Vista Status Window



Vista Status Window

VISTA

X, Y, Z :

The X, Y, and Z values you see in the status window while moving the mouse pointer over the landscape are the X, Y, and Z coordinates of the landscape at that point. If you think of North being the top of the screen, the X coordinate represents the distance in meters East of the left edge of the topographic map. The Y coordinate represents the distance in meters from the bottom of the topographic map. The Z coordinate represents the elevation above sea level in meters of that point of the topographic map.

Generate:

Vistapro generates a new fractal landscape.

Color:

Vistapro calculates the colors of the polygons comprising the landscape based upon their altitude and the topography of the terrain. *Vistapro* does coloring whenever you modify the snow line, tree line, or sea level, or if you render an image at a smaller polygon size than before. *Vistapro* maintains object colors as 15 bits - 5 each of red, green and blue.

Cliffs:

Vistapro places cliff colors on the steep areas. Recalculating cliffs takes place whenever you change snow or tree lines, or if you render an image at a smaller polygon size than before.

Shade:

The Shade function calculates the amount of light reflected by each polygon. Vistapro recalculates shade when you draw a river or lake, select a smaller polygon size, smooth the landscape, or vary the light position.

Sky:

During the Sky function, Vistapro is drawing the sky, including the sky haze effects. This may take several seconds, and Vistapro does not display a counter.

Horizon:

During the Horizon function, Vistapro draws the ground, ocean, or space that surrounds the DEM portion of the view. Because of the haze effect, the time required is several seconds.

VISTA

Render:



example of landscape after rendering

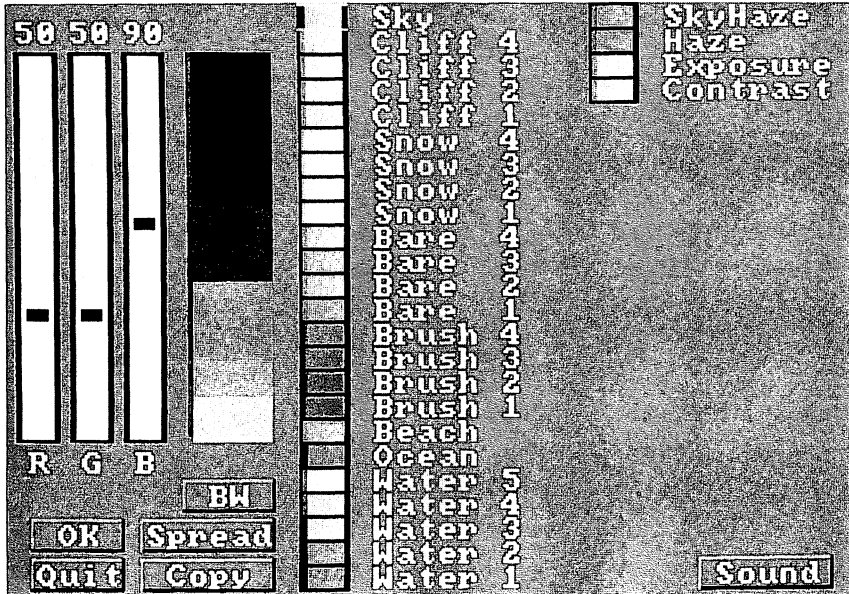
Vistapro draws DEM polygons. The image cannot be seen as it is being drawn, because it is drawn to a virtual screen. We designed Vistapro in this manner to increase its rendering speed and the flexibility of its output. The virtual screen format makes drawing polygons very fast, especially since the final display may be in any of the Amiga's display modes. In the final step, Vistapro converts the image from the virtual screen to display on the real screen. The image is transferred to the

Amiga's screen in several bands from the top to the bottom of the screen. The virtual screen measures 768 by 484 pixels of 24 bits each. The real display is a screen at the resolution you chose before rendering the image. Although *Vistapro* draws the virtual image with 24 bits of color information (16 million colors), the Amiga can only display 4096 colors in HAM mode, 32 colors in lo-res mode, and 16 colors in hi-res mode. *Vistapro* does its best to convert the 16 million possible colors in the virtual screen to the 16, 32, or 4096 colors of the real screen.

In HAM mode *Vistapro* uses two different algorithms for drawing the real screen. If the polygon size is set to either 4 or 8, *Vistapro* uses a crude but fast algorithm. If the polygon size is set to 1 or 2, it uses a more precise, but slower method.

Vistapro calculates steps like coloring and shading only to the level of detail required for the current polygon size. *Vistapro* saves the results of these calculations in memory, so that it will not have to recalculate them. The program doesn't recalculate these tables when switched from a small polygon size to a large polygon size. It uses the data from the small polygons to draw the larger polygons. Therefore, *Vistapro* will not have to recalculate tables, if you re-select smaller size polygons. Once *Vistapro* has made the calculations for small polygons, it will not color or shade renderings with large polygons exactly right. However, we feel this is preferable to recalculating, because it saves time. Large polygon sizes are usually used for previewing, so it doesn't matter if the image generated is not precise. But, you can force *Vistapro* to recalculate the color tables for large polygons by changing the tree line or snow line. Even entering the same value again will force recalculation. To force reshading, click again on the 'Light' button.

Color Control Panel



Color Control Panel

The Color Control Panel controls palette selection and a variety of other functions. The R(ed) G(reen) B(lue) sliders on the left hand part of the screen allow you to select and mix colors. *Vistapro* devotes the center part of the screen to the aspects of landscape coloration under your control. The “OK” button loads the selections made by you and returns you to the main *Vistapro* Control Panel. You can find how to use the various features on the ‘Color Control Panel’ described below.

Colors

You can use the Color palette to change the color ranges for Sky, Cliffs, Snow, Bare Earth, Vegetation (Trees or Brush), and Water. These are the colors of the polygons that make up the landscape. Each of the colors will be 'shaded' and 'faded' by *VistaPro* as it renders.

For example, an apple may be a uniform shade of red, but the side that faces the light is brighter than the side that faces away from the light. The apple will fade towards gray, as you move it farther into the haze. Even though there are only 24 different object colors in *VistaPro*, each of the colors may produce a hundred shades.

VistaPro maps Snow, Bare, and Tree colors to the landscape fundamentally by elevation. *VistaPro* gives the lowest elevations Tree colors, middle elevations Bare colors, and high elevations Snow colors. The same is true for each of the four colors within each segment. It assigns the lowest elevations Tree color 1, slightly higher elevations Tree color 2, and so forth. The designation of colors as Tree, Bare and Snow is arbitrary.

The user is able, for instance, to make them all different shades of red for a Martian landscape, or any colors desired for an especially bizarre picture. The boundary between the different zones is 'fuzzy.' For instance, setting the tree line at 1000 meters doesn't mean that everything below 1000 meters will be tree and everything above it will be set to Bare or Snow. The local shape of the landscape and some random dithering affect all the colors.

VistaPro uses Cliff colors for portions of the landscape where the terrain is very steep. Cliff color 1 is for slightly steep regions, Cliff color 2 for steeper portions, and so on through the range of cliff colorations. It uses Beach color for the boundary (if any) between the sea and the land. *VistaPro* uses River colors for rivers and lakes. It assigns to flat

bodies of water River colors 1 and 2. River colors 3 and 4 indicate rapids. Waterfalls are River color 5. Ocean color is the color of the region surrounding the Elevation Model Data. This color need not be the color of the sea or of water at all. Depending upon the effect desired, it might be green to match the lowest landscape colors.

Sky color is simply the color of the sky. You can obtain an interesting effect by making Sky and Ocean colors black and by setting the Haze value to 0. This creates landscapes that appear to be floating in space. Sky Haze is the color that the sky fades to in the distance. Haze is the color that the land/ water fade to in the distance. Keep in mind that the thickness of the haze (or magnitude of the haze effect) is set by the Haze setting on the main Control Panel. You can produce another interesting effect by setting the Haze and Sky Haze to black and the Haze value to a high number like 28. This makes the landscape look like a night scene lit up by a light behind the camera. Set the exposure and contrast settings with the Exposure and Contrast controls. Higher Exposure settings lead to brighter pictures. Higher Contrast settings lead to more contrast in the images. You can use only the Red slider to control Exposure and Contrast settings.

OK

You can return to the main Vista Control Panels with the 'OK' Button, with any changes you have made intact.

BW

You can set the color palette to black and white with the 'BW' Button for gray shade type of rendering. After selecting 'BW', you can still modify the colors, but the rendering will be done in shades of gray.

Spread

The 'Spread' function provides for a smooth series of color changes from one color to another. In order to use the 'Spread' function, click on the upper color, click on 'Spread' and then click on the lower color. As an example, suppose you want the lowest elevation of brush to be a dark green and the highest to be a light green. You would set the Brush 1 color to a light green, and the Brush 4 color to a dark green, and use 'Spread' to fill in the colors for Brush 2 and Brush 3.

Quit

You may return to the main Vista Control Panel by using the 'Quit' Button. This resets the colors back to what they were before you entered the 'Color Control Panel'.

Copy

The 'Copy' Button copies a color from one palette segment to another. Click on the color you want to copy, then click on 'Copy', and finally click on the color you want to change. You will see the second color change to be the same as the first.

Sound

The fractal 'music' generated by *Vistapro* is a musical rendering of the values of the polygons *Vistapro* is using to generate the final image before display. It is the sound of fractal mathematics in action.

Colors

Sky

This is the primary color that *Vistapro* will use in generating the sky. Haze and Sky Haze will alter this when appropriate.

Cliff 1-4

These are the primary colors that *Vistapro* will use in generating Cliff regions in a landscape. Cliff 4 represents the steepest cliffs, and Cliff 1 the least steep. *Vistapro* will use shades of these colors when these areas are in shadow.

Snow 1-4

These are the primary colors that *Vistapro* will use in generating regions of the landscape that are above the snow line. Snow 4 is the highest elevation above the snow line and Snow 1 is the lowest. *Vistapro* will use shades of these colors when these areas are in shadow.

Bare 1-4

These are the primary colors that *Vistapro* will use in generating regions of the landscape that lie between the tree line and the snow line, and that are not as steep as cliffs. Bare 4 is the highest such elevation and Bare 1 the lowest. *Vistapro* will use shades of these colors when these areas are in shadow.

Brush 1-4

These are the primary colors that *Vistapro* will use in generating the region of the landscape between sea level and the timber line. Brush 4 is the highest such elevation and Brush 1 the lowest. *Vistapro* will use shades of these colors when these areas are in shadow.

Beach

This is the primary color that *Vistapro* will use to separate the bottom of the brush area from any sea that has been generated. It will use shades of this color when these areas are in shadow.

Ocean

This is the primary color of the area that is at sea level surrounding the topographic data. *Vistapro* will use shades of this color when these areas are in shadow.

Water 5 - Waterfalls

This is the primary color that *Vistapro* will use when water passes over an area of cliff. It will use shades of this color when these areas are in shadow.

Water 1-4

These are the primary colors that *Vistapro* will use for rivers and lakes. Water 4 represents the 'fastest' water, and Water 1 the most placid. *Vistapro* will use shades of these colors when these areas are in shadow.

SkyHaze

Vista*pro* will add this color to the sky near the surface, depending upon the amount of haze selected. There will be a smooth transition from sky color to sky haze color as the sky approaches the horizon in the distance.

Haze

Vista*pro* will add this color to land areas based upon the distance from the camera and the amount of haze selected.

Exposure

This is similar to the 'F' stop on a camera lens. The longer the exposure, the lighter the final image.

Contrast

This regulates the contrast of the final image. High contrast will make the darker areas very dark, and the lighter areas very light. Low contrast will lessen the difference between the dark and light areas.

Viewer

Viewer is a proprietary animation player written by Hypercube Engineering and distributed by Virtual Reality Laboratories, Inc. It allows you to play VANIM files at up to 13 frames per second from your hard disk. It has a very simple straightforward interface, and is quite easy to use.

To use Viewer, simply type: Viewer <myanim>

where <myanim> is the name of the animation you created with Vistapro using the VANIM format.

You can control the speed with which Viewer plays your animation by pressing the number keys on your main keyboard. (Not the numeric keypad!!!) The number 1 is slowest, and the number 0 is fastest. The numbers between 1 and 0 represent increments of speed change.

You can use the keypad to control the direction that your anim plays, as well as single frame, skip 10 frames, go to beginning and go to end.

7 Go to first frame	8 Forward	9 Go to last frame
4 Go back 10 frames	5 Stop	6 Go forward 10 frames
1 Go back 1 frame	2 Reverse	3 Go forward 1 frame

VISTA

You may exit from the Viewer program using the ESC key.

When viewing a large animation, it helps to have a lot of disk buffers. Use the AmigaDOS 'AddBuffers' command to add disk buffers. We recommend about 2 buffers for each frame of the animation. For example, for a 500 frame VANIM file (24 megabytes in HAM, no interlace or overscan), on drive DH0:, you should have about 1000 disk buffers. This can be accomplished by typing "AddBuffers DH0: 1000", at the AmigaDOS Shell or CLI prompt. You only need to do this once, each time you re-boot your Amiga. A thousand buffers will consume about a half of a megabyte of memory.

Appendix A

What are Fractals and Fractal Geometry?

by Daniel Wolf Ph.D.

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The concept of fractal geometry is the basis of *Vista~~pro~~*'s capacity to generate imaginary scenes. Many computer graphics enthusiasts, especially in the Amiga community, have become interested in fractal graphics through programs such as *Vista~~pro~~*, *FractalPro*, and public domain 'Mandelbrot' and 'scenery' programs. The popularity of fractal graphics using personal computers traces back to the appearance of stunning images of the Mandelbrot Set (a type of fractal object) on the cover of *Scientific American* in August of 1985. That widespread exposure of these strangely beautiful abstract objects led many amateur and professional programmers to the original source book on fractals: *The Fractal Geometry of Nature* (by Benoit Mandelbrot). While fractals and fractal geometry have become 'hot' buzzwords in the computer graphics field, it is not exactly obvious what they are. The following description is simplified, and interested students and readers should read Mandelbrot's book on the subject.

We owe the word 'fractal' to Mr. Mandelbrot, a mathematician and Fellow at IBM's Watson research organization in New York. Fractal refers to objects with 'fractional dimensions,' that is, objects which don't really fit into the ordinary world of things like lines (1-dimensional), surfaces (2-dimensional) and solids (3-dimensional). Fractals are objects which fit 'in-between' these normal-dimensional objects. Mandelbrot took an interest in a long-neglected area of mathematics which originated at the turn of this century. Some devotees of geometry at that time began to study lines which didn't behave like ordinary lines.

VISTA

If you read Mandelbrot's book you'll become familiar with some of the mathematical history of things like Peano curves, Hilbert curves, and Koch snowflakes. What makes these objects so strange, and what led Mandelbrot to look deeper, are two properties: these 'lines' tend to fill up a 2-dimensional surface (they act as if they are something in-between lines and planes), and their appearance seems to be identical no matter how much they are magnified. Magnified small portions of these 'fractal' lines tend to look like the whole unmagnified line. Odd indeed! Mathematicians at the turn of the century tended to call such objects pathological and didn't have a good way of integrating them into the rest of mathematics, especially geometry. Geometry was mostly dominated by the study of well-behaved, smooth, simple forms like lines, planes, and solids. Mandelbrot made a systematic study of these weird 'fractional' dimension geometric forms and helped bring them into the mathematical fold. Mandelbrot also showed how these objects are models of many things found in the natural world, like surface textures of mountains, coastlines of islands, and branching designs of plants, trees, blood vessels, and lung tubes (bronchi).

If you want to get a mental picture of how *Vistapro* exploits fractal geometry to generate natural-looking land surface textures, take the following little mental journey into the process of 'crumpling' a sheet of paper:

1. Imagine a flat triangular sheet of paper.
2. Divide the sheet into a small number of sub-triangles.
3. Randomly select some of the intersection points and raise or lower them (by a large amount) above the original plane of the flat sheet.
4. Now divide the sub-triangles into smaller sub-triangles.
5. Randomly raise and lower some of the newly created corner points like you did in step 3, but by a smaller amount than in step 3.

6. Keep repeating steps 4 and 5 making smaller and smaller sub-triangles and raising and lowering corner points randomly by smaller and smaller amounts at each step.
7. Stop when you've reached a point where each smaller division into sub-triangles can't make any more difference in appearance on a limited resolution display like a computer monitor.
8. Now color all the little sub-triangles by a method which makes the highest corner points white (snow on the mountain tops), lower ones brown and green (mountain sides with trees) and the lowest ones blue (a lake at the bottom of the mountain valley).

If we did Steps 4 and 5 using some regular (non-random) technique, in the end the highly crumpled surface would be a lot like the first fractals explored by Mandelbrot; they would look similar at any degree of magnification they were viewed. The introduction of randomness to the process makes them look 'similarly random' at different degrees of magnification.

If you are interested in further exploring fractal geometry, here are some great books:

The Fractal Geometry of Nature (by B. Mandelbrot) *The Beauty of Fractals* (by H. Peitgen and P. Richter) *The Science of Fractal Images* (by H. Peitgen and D. Saupe)

Appendix B

The Landscapes

Most of the landscape DEM files were obtained from the USGS and are accurate to within 30 meters. Some of the files were assembled to fit into Vista and therefore may not be perfect where they are joined.

ElCap.scape:

ElCap is a section of Yosemite Valley in California out of which rises El Capitan, a very large (about 1000 meters) granite cliff formation at coordinate 2520,5760 (X, Y) in the DEM data. This landscape was created by joining together two USGS DEM files and then clipping out the section of interest. A small “scar” that runs North/South where the USGS data did not quite line up can be seen. The joining scar is most apparent in the Valley with the sun shining from the east or west at approximately 3400,4980. This DEM file is as accurate as the original USGS data.

HalfDome.scape:

The HalfDome section of Yosemite Valley contains the famous granite formation know as Half Dome at location 5100,7260. The method used by the USGS to digitize the terrain led to some distortion at the top and edges of Half Dome. The jaggy bump at the top of Half Dome is a USGS artifact. This DEM file is as accurate as the original USGS data since it was simply clipped out of one DEM file.

CraterLake.scape:

Crater Lake is the caldera of an ancient volcano in Oregon. The walls of the caldera rise approximately 1250 meters from the bottom of the lake to the top of the caldera. The DEM data includes the underwater elevations. The lake fills the caldera to a level about half way up the walls. The mound near the west edge of the caldera is Wizard Island. It is separated from the edge by the lake. The circular mound near the top of the caldera is completely submerged. The lake can be filled with water using the Lake function of Vista. Clicking the mouse button about halfway from Wizard Island to the edge of the caldera gives approximately the right water level. In order to include the entire lake in the file, everything was adjusted down by a factor of 0.6. Therefore, to convert elevations or distances into actual meters, take the values given by Vista and divide them by 0.6.

MSHB.scape: and MSHA.scape:

Mt. St. Helens is the volcano in Washington that blew its top on May 18, 1980. The explosive eruption was preceded by amounts of intense earthquake activity. A 150 meter bulge started to grow in April at a rate of 5 meters per day. A magnitude 5.1 earthquake set into motion the collapse of the bulge and the following explosion. Winds from the blast were calculated at 670 miles per hour. Almost everything within 8 miles of the blast was obliterated. Virtually all trees were flattened at distances up to 19 miles from the volcano. Significant amounts of volcanic ash fell as far as one thousand miles away. The new crater is about 3 kilometers wide and 700 meters deep. The “before” data was generated from stereo photographs taken in 1979. The “after” data comes from photographs taken late in 1980.

Mons.scape:

Olympus Mons is a huge volcano on the surface of Mars that is roughly twice as tall as Mt. Everest on earth! It is about 500 kilometers in diameter and rises approximately 18 kilometers above the surrounding landscape. The original DEM file which contains the entire volcano is over 4 megabytes! The DEM file included here contains only the interesting caldera portion of the volcano. The technique used by the USGS to generate this kind of extra-terrestrial data creates extensive artifacting resulting in raked lines in the landscape. One or two smoothing passes will remove these artifacts. The data on the vertical axis is exaggerated by 4 fold to make the landscape more dramatic. Elevations are measured from an arbitrary reference, because there is no sea level on Mars.

Julia.scape: and Mandelbrot.scape:

Julia and Mandelbrot landscapes are artificially generated by a mathematical algorithm. The user may have seen Julia sets and Mandelbrot sets displayed as colors on a 2-D screen. If the user has a Mandelbrot generating program that will handle Julia sets, or a Julia generating program, the locations are as follows: The Mandelbrot is 1.255525 real – 0.381060 imaginary, with a diameter of approximately 0.007; the location of the Julia set is 0.75 real – 0.11 imaginary, relative to the Mandelbrot set.

Arrowhead.scape:

This is the Lake Arrowhead region of the San Bernardino Mountains in Southern California. The low-lying region forms a lake that is in the shape of an arrowhead, hence the name. The lake was formed by the addition of a man-made dam, which is not part of the DEM data, so it

is impossible to fill the lake without flooding the landscape below. This is clipped from a larger data set that is also available from VRLI, called 'Lake Arrowhead and Environs'.

Vantage.scape:

This is a portion of the Columbia River in the state of Washington that forms the north portion of Wanapum Lake. It is located in Ginkgo State Park near Vantage, Washington.

SanLuisObispo.scape:

This is the area that we see when we look out our windows. VRLI is located toward the southeast portion of the topographic map. The mountains are not of spectacular height, but it forms quite a pleasing landscape.

SanGorgonio.scape:

This is south of the Big Bear Lake region of the San Bernardino Mountains in Southern California. It contains Mt. San Gorgonio, a 3500 meter peak in an area known as the San Gabriel wilderness. This is clipped from a larger data set that is available from VRLI, called the 'San Gorgonio Mountain and Environs'.

BigSur.scape:

This is the Big Sur area along the coast of north central California, just south of the Monterey Peninsula. It contains the Pfeiffer Big Sur National Park. It is one of the more beautiful camping areas in California, and contains one of the southernmost groves of redwoods. It is clipped from a larger data set that is available from VRLI, called 'Big Sur and Environs'.

VISTA

MorroBay.scape:

This is the data set for Morro Bay, one of our local tourist attractions on the central coast of California. There is a large rock that juts up into the fog called Morro Rock. This is visible as a mound in the northwest corner of the topographic map.

MtBaldy.scape:

Contrary to popular belief there is no such mountain as Mt. Baldy in southern California. That is the name of the village on the slopes of Mt. San Antonio. This is located in the San Gabriel mountains south of Wrightwood. This has been clipped from a larger data set that is available from VRLI, called 'Mt. Baldy and Environs'.

MtAdams.scape:

This contains Mt. Adams, in the southern portion of Washington State. It is part of the Mt. Adams Wilderness, and is a good example of a volcano, reaching from a height of over 3700 meters at its peak. It was clipped from a larger data set that is available from VRLI, called 'Mt. Adams and Environs'.

WoodSh.scape:

This is the first of our undersea data, a volcanic region located at 21 degrees 13 minutes north and 166 degrees 24 minutes east, 500 miles north of Wake Island. This is actually several thousand meters below sea level, but has been scaled to appear above sea level for rendering purposes.

Appendix C

Glossary of Terms

AI

Artificial Intelligence. The ability of a program to incorporate expert judgement enabling it to imitate intelligent decision making.

Aliasing Artifacts

Objects which appear in a landscape which are not derived from mapping data. They may reside in the data or they may be formed as a result of the program.

Caldera

The crater at the top of a volcano.

DEM

Digital Elevation Model is a model of a landscape reduced to three dimensional digital coordinates.

Digi Paint

A paint program published by NewTek and used to display or modify IFF picture files created by Vista.

Digital Elevation Model

Digital Elevation Model is a model of a landscape reduced to three dimensional digital coordinates. Abbreviated: DEM.

VISTA

Dithering

A program function which blurs the boundaries between polygons in order to more closely simulate realism in landscape creation.

Fat Polys

Foreground polygons which are relatively larger than the polygons in distant scenes. Fat Polys are a function of perspective and the accuracy of the data being rendered.

Fractal

Fractional dimension. Most math deals with whole numbered dimensions. One dimension is a point. Two dimensions are a line. Three dimensions are a solid. Four dimensions are a space-time solid, and so on. Fractals deal with non-whole numbered dimensions, and fractal geometry is capable of producing pictures which are remarkably similar to natural phenomena - particularly geological shapes.

Fractal Pro

A professional level fractal program published by MegageM.

HAM

Stands for Hold and Modify. A technique used to display more colors than the 4096 the Amiga normally handles.

Haze

The atmospheric occlusion that increases with the distance between the eye and the target.

IFF

The standard graphic file format used on the Amiga.

Jaggies

Partial polygons which produce jagged lines often at the ridge line of a landscape and sometimes in the foreground. Jaggies distort the realism of a scene.

Olympus Mons

A volcano on Mars. Olympus Mons is an extremely vast feature. The base of the volcano covers an area the size of Nebraska. Olympus Mons also has a feature which is unique within the solar system. The base of the volcano is well within the thin atmosphere of Mars. The peak of the volcano is virtually above the Martian atmosphere allowing launch to orbit by magnetic acceleration. A tramway could be constructed from the base of Mons Olympus to the top of Mons Olympus. Liquefied carbon dioxide, water, hydrogen, and oxygen (condensed from the atmosphere) could then be transported for magnetic rail launch into orbit at the top. A return from space could be accomplished with aerobraking. Therefore, Mons Olympus could become the basis for a Martian space transportation system which did not require rockets.

Polygons

The basic geometric units with which Vista renders landscapes. A polygon is a two dimensional shape having at least three linear sides.

Ray Tracing

A method of image generation where a hypothetical ray of light is projected, reflecting off the target and ultimately colliding with the camera.

VISTA

Topography

Science of drawing maps representing the surface features of a region.

Topology

The study of the surface features of a region.

Turbo Silver

Turbo Silver is an art program published by Impulse. It allows display and manipulation of three dimensional objects including landscapes exported by Vista.

USGS

United States Geological Survey. The USGS has created three dimensional maps of much of the United States, some undersea landscapes, and some extra terrestrial landscapes. Much of the work done by USGS is in the public domain and can be adapted for display by Vista.

XYZ Coordinates

XYZ coordinates simply refer to the three dimensions necessary to define a solid object. By translating the topology of a landscape into XYZ coordinates, the three dimensional topography can be stored in digital format and can be easily manipulated by Vista's landscape rendering engine.

Appendix D

Vistapro Tutorials

To run the following tutorials, you need to start up *Vistapro*, by double clicking on the *Vistapro* icon. You will be ready to start when you see a screen with the *Vistapro* Control Panels on the right hand side of the screen, and the empty topographical map on the left.

I. Loading a DEM Landscape

In order to load a Vista DEM Landscape File, first you position the mouse pointer at the top of the screen. Press and hold down the right mouse button. (You must be at the very top of the screen.) You will see the words 'Project', 'Script', and 'Display' in the menu bar at the top of the screen. Still holding the right mouse button down, move the mouse pointer over the word 'Project'. At this time you should see the project Menu appear. Still holding down the right mouse button, move the mouse pointer down until it is over the 'Load Landscapes' Menu Item. This should cause another Sub Menu to be displayed to the right. Still holding the right mouse button down, move the mouse pointer to the right, making sure to remain over the words 'Load Landscape' while moving, until you reach the 'Vista DEM' Sub Menu Item. When this item is highlighted, (by moving the mouse pointer over it) you then need to release the right mouse button.

Now you should see the *Vistapro* File Requester. It looks like a window with the words 'Load Vista DEM' in the title bar. You will see a box with the word 'Drawer' in it and a black space to the right of it. Below this will be a listing of the files on your disk. To the right of this list, you will see a lighter brown 'drag gadget'. Click on the solid light brown area with the left mouse button and hold it down. By moving the mouse up and down, you should see the contents of the window change. Move the mouse down until the words 'Landscapes (dir)'

VISTA

appear in the window, and release the left mouse button. Click on the word 'Landscapes' once with the left mouse button. The word 'Landscapes' should appear in the black area next to the Drawer button, and the contents of the window should change. At this point you should see a list of files with the extension '.scape'. You may view this entire list by clicking on the drag gadget to the right and moving it up and down. When you have found the landscape that you want to view, click once on the name of that landscape, and then click on the 'OK' button. At this time, *Vistapro* will begin loading the landscape, which will take several seconds to a minute to complete.

If you want to load a landscape from another disk, such as the Landscapes disk that comes with *Vistapro*, place this disk in drive DF0: or DF1:, and click once in the black area to the right of the Drawer button. When the green rectangle appears, type the drive id, (DF0: or DF1:) and press the <return> key. You should now have a list of '.scape' files displayed, that you can use in the same way as is described above.

At this point you can skip the next tutorial and go to 'Saving your Landscape' or 'Adding Rivers and Lakes'.

II. Creating an Imaginary Fractal Landscape

At the right hand side of the screen you can see the *Vistapro* Control Panels. At the bottom of the Middle Control Panel you will see the 'Frac' Button. Move the mouse pointer until it is on top of this button and click once with the left mouse button. You will notice the lower control panel change to become the Fractal Lower Control Panel.

At the upper left of the Control Panel you will see the 'Random' and 'Island' buttons. The Random button causes a random landscape to be generated. If the 'Island' button has been pressed, the landscape that is generated is one where there are peaks surrounded by lower elevations, which can be made into Islands by adjusting the Sea Level. (The 'Sea' button is on the upper portion of the middle control panel.) Otherwise, the landscapes that are generated look like they were cut from a

piece of terrain. You can regenerate this identical landscape at any time by remembering the number that appears in the black box under the Random button, as well as the Island button setting. Just click on the black box and enter the number and press the <return> key.

You can use the FrDim button to change the vertical scale of the mountains and hills on the random landscape, and the Frctlz button to change the roughness of the landscape. You will need to experiment a bit to find the settings that are most to your liking. This experimentation should probably wait until you are more familiar with all of the features of *Vista_{pro}*.

III. Saving your Landscape

In order to save a Vista DEM Landscape File, first position the mouse pointer at the top of the screen. Press and hold down the right mouse button. (You must be at the very top of the screen.) You will see the words 'Project', 'Script', and 'Display' in the menu bar at the top of the screen. Still holding the right mouse button down, move the mouse pointer over the word 'Project'. At this time you should see the Project Menu appear. Still holding down the right mouse button, move the mouse pointer down until it is over the 'Save Landscapes' Menu Item. This should cause another Sub Menu to be displayed to the right. Still holding the right mouse button down, move the mouse pointer to the right, making sure to remain over the words 'Save Landscape' while moving, until you reach the 'Vista DEM' Sub Menu Item. When this item is highlighted, (by moving the mouse pointer over it) then you need to release the right mouse button.

Now you should see the *Vista_{pro}* File Requester. It looks like a window with the words 'Save Vista DEM' in the title bar. You will see a box with the word 'Drawer' in it and a black space to the right of it. Below this will be a listing of the files on your disk. To the right of this list, you will see a lighter brown 'drag gadget'. Click on the solid light brown area with the left mouse button and hold it down. By moving the mouse up and down, you should see the contents of the window

VISTA

change. Move the mouse down until the words 'Landscapes (dir)' appear in the window, and release the left mouse button. Click on the word 'Landscapes' once with the left mouse button. The word 'Landscapes' should appear in the black area next to the Drawer button, and the contents of the window should change. At this point you should see a list of files with the extension '.scape'. You may view this entire list by clicking on the drag gadget to the right and moving it up and down.

If you want to save a landscape to another disk, place this disk in drive DF0: or DF1:, and click once in the black area to the right of the Drawer button. When the green rectangle appears, type the drive id, (DF0: or DF1:) and press the <return> key.

At this point, click once in the black box to the right of the word 'File', and type in the name of the file you would like your landscape to be named, and press the <return> key. You will see the 'Busy' mouse pointer while the landscape is being saved.

IV. Adding Rivers and Lakes

When beginning this tutorial, you should have already loaded or created a landscape. On the left hand side of the *Vista^{pro}* screen, there is a topographic map. This map is colored by elevation, dark green being the lowest, and white being the highest. Move your mouse pointer over the landscape, and you will see the X, Y, and Z figures in the Status Window change. These describe the location of the pointer on the map, and the elevation of the terrain under the pointer. In order to create a river, first select the location for the highest point of the river. Water runs down hill, so you will want this location at the top of a canyon, or between hills. Click once with the left mouse button on the 'River' button in the Middle Control Panel. Move the mouse pointer to the location you selected for the highest point of your river, and click one more time with the left mouse button. You will see a blue stream appear which will follow the contour of the land to the

lowest elevation on the contour map, or the edge of the map. Each river you add should follow the same procedure.

Lakes may be created using a similar procedure. You will want to ensure, however, that the location of your lake will be bounded by land above the water line that you choose, or the lake will spill over into other areas of your landscape. To use the lake function, click once with the left mouse button on the 'Lake' button in the Middle Control Panel. Then locate the elevation that you want for a water line by moving the mouse pointer over the landscape where you want to put a lake, and watching the Z value. When you have located the desired point, click once with the left mouse button, and watch the lake fill.

V. Scaling a Landscape

When beginning this tutorial, you should have already loaded or created a landscape. On the left hand side of the *Vista_{pro}* screen, there is a topographic map. This map is colored by elevation, dark green being the lowest, and white being the highest. Move your mouse pointer over the landscape, and you will see the X, Y, and Z figures in the Status Window change. These describe the location of the pointer on the map, and the elevation of the terrain under the pointer. You may turn hills into mountains, or shrink mountains down to hills. Click once in the black box under the word 'Scale' in the Middle Control Panel, and enter a new value to replace the one you find there. A number greater than 1 will increase the height of hills and mountains, and less than one will decrease them. The number is a height multiplier. If you increase the height of a mountain beyond 32767 meters, its height will become negative, and you will have a very deep pit replacing the top of the mountain. You can use this to make volcanos. Scale a mountain up until you see pits appearing on the topographic map, and then scale it back down to 1, and you have your mountain as a volcano. Always remember to press the <return> key after entering a value in the scale box.

VI. Saving your modified Landscapes

In order to save a Vista DEM Landscape File, first position the mouse pointer at the top of the screen. Press and hold down the right mouse button. (You must be at the very top of the screen.) You will see the words 'Project', 'Script', and 'Display' in the menu bar at the top of the screen. Still holding the right mouse button down, move the mouse pointer over the word 'Project'. At this time you should see the Project Menu appear. Still holding down the right mouse button, move the mouse pointer down until it is over the 'Save Landscapes' Menu Item. This should cause another Sub Menu to be displayed to the right. Still holding the right mouse button down, move the mouse pointer to the right, making sure to remain over the words 'Save Landscape' while moving, until you reach the 'Extended DEM' Sub Menu Item. When this item is highlighted, (by moving the mouse pointer over it) then you need to release the right mouse button.

Now you should see the *Vistapro* File Requester. It looks like a window with the words 'Save Extended Vista DEM' in the title bar. You will see a box with the word 'Drawer' in it and a black space to the right of it. Below this will be a listing of the files on your disk. To the right of this list, you will see a lighter brown 'drag gadget'. Click on the solid light brown area with the left mouse button and hold it down. By moving the mouse up and down, you should see the contents of the window change. Move the mouse down until the words 'Landscapes (dir)' appear in the window, and release the left mouse button. Click on the word 'Landscapes' once with the left mouse button. The word 'Landscapes' should appear in the black area next to the Drawer button, and the contents of the window should change. At this point you should see a list of files with the extension '.scape'. You may view this entire list by clicking on the drag gadget to the right and moving it up and down.

If you want to save a landscape to another disk, place this disk in drive DF0: or DF1:, and click once in the black area to the right of the Drawer button. When the green rectangle appears, type the drive id, (DF0: or DF1:) and press the <return> key.

At this point, click once in the black box to the right of the word 'File', and type in the name of the file you would like your landscape to be named, and press the <return> key. You will see the 'Busy' mouse pointer while the landscape is being saved.

VII. Setting Camera and Target Locations

This tutorial assumes that you have a landscape loaded or have just created a landscape. The 'Camera' represents the location that your camera would be in if you were actually in the landscape trying to take a picture. To set the Camera position, you should click the left mouse button while the mouse pointer is above the 'Camera' button. Then move the mouse pointer over to the topographic map to where you would like to be standing if you were taking a picture. When you have found this point, click once with the left mouse button to set the camera location. If you would like to be above the surface, as if on a tall ladder, you can now click on the black box to the left of the 'Z' button under the Camera button. You can now add the height of your ladder to the number you find there, and press the <return> key. This raises you up off of the surface, but leaves you in the same location.

Now you need to tell the camera which way to be pointing when taking the picture. This is done by clicking on the 'Target' button with the left mouse button, and then positioning the mouse to the point at which you want to aim the camera, and clicking the left mouse button again. You can change the vertical position of the target in the same way you did with the camera.

VIII. Changing the Haze Level

The haze level is the amount of haze that will appear in the final rendering between the camera, target and horizon. With a 0 haze level, the horizon will be crystal clear, but you will lose a little of the depth of the image. To set or change the haze level, click once on the 'Haze' button, and then position the mouse pointer at the target location and click on the left mouse button. Alternatively, you can click once with the left mouse button on the black box to the right of the Haze button, and enter a value. You must be certain to press the <return> key.

IX. Test Rendering your Settings

This tutorial assumes that you have a landscape loaded into *Vistapro*, or have just created one, have added lakes and rivers, and positioned the camera and target. You can now get a rough idea of what the picture will look like by clicking once on the '8' button next to the word 'Poly'. This sets up *Vistapro* to render only 2000 polygons per frame, which is a lot faster than the 133000 polygons of level '1'. Now click on the 'Render' button, and wait while *Vistapro* renders the landscape. After the landscape is rendered, you can return to the Control screen by clicking anywhere on the screen with the left mouse button. At this point, you can change your camera and target positions as outlined above, and re-render until you have the setting that you want.

X. Smoothing out Irregularities

Sometimes the data from the USGS contains lines where pieces of map were patched together, and other artifacts of the process by which topographic data is digitized. This data can be smoothed out using the 'Smooth' button. To see an example of this artifacting, load the 'Mons.scape' landscape from the Landscape Disk, (see the Loading a Landscape tutorial) position the camera and target on opposite sides of

the caldera, (see the Camera and Target tutorial) and render at level '1'. (See the Test Rendering a Landscape tutorial.) You will see tracks crisscrossing the landscape. After clicking on the 'Smooth' button, most of this artifacting will have vanished. This can be done several times, but take note that each pass removes some detail from the landscape.

XI. Blending, Gouraud Shading, and Dithering

When rendering a landscape, even at Polygon size '1', you will often see small triangles in the close up portions of the picture. This is because the USGS data used to make the Vista DEM files is made up of elevation points that are about 30 meters apart. When that distance is more than 1 pixel wide, then that point in the landscape will render as a triangular block. There are several methods of 'hiding' these blocks when rendering. This is not a tutorial as such, but a series of methods that you may combine with the knowledge you have gained from the other tutorials to improve the quality of your finished pictures.

Blending smooths the changes in color from polygon to polygon, causing the small polygons to be less apparent, especially in the distance. To use blending, click on the 'Blend' button, in the Main Lower Control Panel, before you render a picture. The button will remain pushed in until you again click on it to disable it.

Gouraud Shading smooths the boundary between polygons, making it a lot less apparent that they are even there. It also smooths out the sharp features in a landscape, turning the distance from a photographic quality into an artists rendition. Gouraud Shading may be enabled by pressing the 'GShade' button, in the Main Lower Control Panel, before rendering a picture. The button will remain pushed in until you again click on it to disable it.

There are two methods of dithering available with *Vista^{pro}*. The first, using the 'Dithr' button causes a blending of the elevation colors, reducing the sharpness of the snow and tree lines. This can be changed by clicking on the black box below the word 'Dithr' in the Middle

VISTA

Control Panel, and entering a new value. Larger values result in more dithering, smaller in less.

The second method is called pixel dithering. This causes the colors within an area to be dithered, or merged with one another at the pixel level. This can be set by clicking on the black box to the right of the 'PDthr' button on the Main Lower Control Panel, and entering a new value. Larger values result in more dithering, smaller in less. You can add so much dithering so as to make the landscape entirely unrecognizable.

XII. Setting the Light direction

This tutorial assumes that you have loaded a landscape or created a fractal one, and it is still loaded into *Vistapro*. The first thing you need to do is to make the Lower Light Control Panel visible. Click on the 'Light' button in the Middle Control Panel. Now you will see a new Lower Control Panel. On the left of this panel are the 'N', 'E', 'S', and 'W' buttons for the most simple light directions. These represent light coming from the north, east, south or west at 45 degrees above the horizon. If you want your light source to come from one of these directions, then click on the button representing the direction that you want the light to come from. If however, you want the light to come from a different direction, click on the 'Custom' button, and move the mouse pointer over to the topographic map. You will see a target drawn around the map, with the lines representing the altitude of the light source in degrees from vertical, and a line radiating out from the center representing the direction from the center to the light source. When you have located the light where you want it, click on the topographic map with the left mouse button.

XIII. Changing Colors

With *Vistapro*, you do not have to be satisfied with the colors that we provide for you. If you would like to change the colors in a landscape, click on the 'Palet' button in the Middle Control Panel. This will

activate the Color Control Panel. There are a band of colored boxes bordered in black going from top to bottom in the middle of the screen. These are colors that represent the various terrain types, elevations and steepness. The terrain type is named off to the right of the box. Elevations go from 1 being the lowest to 4 being the highest, and steepness from 1 being least steep to 5 being steepest (waterfalls). To change a color, click on the colored box representing the terrain that you would like to change, and adjust the red, green and blue sliders on the left until you have the color you want. The colored band between the adjustment sliders and the color gadgets represents the shades that *Vistapro* will choose for that terrain depending upon the amount of shadowing. When you have made all of the changes that you would like, then click on the 'OK' button to return to the *Vistapro* Control Screen.

XIV. Saving your ColorMap

In order to save a Vista ColorMap File, first position the mouse pointer at the top of the screen. Press and hold down the right mouse button. (You must be at the very top of the screen.) You will see the words 'Project', 'Script', and 'Display' in the menu bar at the top of the screen. Still holding the right mouse button down, move the mouse pointer over the word 'Project'. At this time you should see the Project Menu appear. Still holding down the right mouse button, move the mouse pointer down until it is over the 'Save Landscapes' Menu Item. This should cause another Sub Menu to be displayed to the right. Still holding the right mouse button down, move the mouse pointer to the right, making sure to remain over the words 'Save Landscape' while moving, until you reach the 'ColorMap' Sub Menu Item. When this item is highlighted, (by moving the mouse pointer over it) then you need to release the right mouse button.

Now you should see the *Vistapro* File Requester. It looks like a window with the words 'Save ColorMap' in the title bar. You will see a box with the word 'Drawer' in it and a black space to the right of it. Below this will be a listing of the files on your disk. To the right of this list,

VISTA

you will see a lighter brown 'drag gadget'. Click on the solid light brown area with the left mouse button and hold it down. By moving the mouse up and down, you should see the contents of the window change. Move the mouse down until the words 'Landscapes (dir)' appear in the window, and release the left mouse button. Click on the word 'Landscapes' once with the left mouse button. The word 'Landscapes' should appear in the black area next to the Drawer button, and the contents of the window should change. At this point you should see a list of files with the extension '.scape'. You may view this entire list by clicking on the drag gadget to the right and moving it up and down.

If you want to save a landscape to another disk, place this disk in drive DF0: or DF1:, and click once in the black area to the right of the Drawer button. When the green rectangle appears, type the drive id, (DF0: or DF1:) and press the <return> key.

At this point, click once in the black box to the right of the word 'File', and type in the name of the file you would like your landscape to be named, and press the <return> key. You will see the 'Busy' mouse pointer while the landscape is being saved. You can save your ColorMaps in a drawer by themselves, and with an extension of '.cmap', so you don't get them confused with the regular landscapes.

XV. Loading a new ColorMap

In order to load a Vista ColorMap File, first position the mouse pointer at the top of the screen. Press and hold down the right mouse button. (You must be at the very top of the screen.) You will see the words 'Project', 'Script', and 'Display' in the menu bar at the top of the screen. Still holding the right mouse button down, move the mouse pointer over the word 'Project'. At this time you should see the Project Menu appear. Still holding down the right mouse button, move the mouse pointer down until it is over the 'Load Landscapes' Menu Item. This should cause another Sub Menu to be displayed to the right. Still holding the right mouse button down, move the mouse pointer to the

right, making sure to remain over the words 'Load Landscape' while moving, until you reach the 'ColorMap' Sub Menu Item. When this item is highlighted, (by moving the mouse pointer over it) then you need to release the right mouse button.

Now you should see the *Vista_{pro}* File Requester. It looks like a window with the words 'Load ColorMap' in the title bar. You will see a box with the word 'Drawer' in it and a black space to the right of it. Below this will be a listing of the files on your disk. To the right of this list, you will see a lighter brown 'drag gadget'. Click on the solid light brown area with the left mouse button and hold it down. By moving the mouse up and down, you should see the contents of the window change. Move the mouse down until the words 'Landscapes (dir)' appear in the window, and release the left mouse button. Click on the word 'Landscapes' once with the left mouse button. The word 'Landscapes' should appear in the black area next to the Drawer button, and the contents of the window should change. At this point you should see a list of files with the extension '.scape'. You may view this entire list by clicking on the drag gadget to the right and moving it up and down. When you have found the landscape that you want to view, click once on the name of that landscape, and then click on the 'OK' button. At this time, *Vista_{pro}* will begin loading the landscape, which will take several seconds to a minute to complete.

If you want to load a ColorMap from another disk, such as from the Landscapes disk that comes with *Vista_{pro}*, place this disk in drive DF0: or DF1:, and click once in the black area to the right of the Drawer button. When the green rectangle appears, type the drive id, (DF0: or DF1:) and press the <return> key. You should now have a list of '.scape' files displayed, that you can use in the same way as is described above.

If you have created your own drawer for Colormaps, and have saved them with the .cmap extension, replace 'Landscapes' with the name of your Colormap drawer, and '.scape' with the extension '.cmap', in the above tutorial.

XVI. Rendering a Finished Picture

When you are satisfied that you like the landscape you have loaded, where you have positioned the camera and target, the direction from which the light is coming, the position of rivers and lakes in your landscape, and the amount of dithering or shading that this picture needs, then you are ready to do a final rendering. Click on the '1' button to the right of the word 'Poly' and then click on the 'Render' button on the Main Lower Control Panel. Depending upon the speed of your machine, the light source, and the complexity of the image, it could take anywhere from 4 minutes to an hour to render an image. A machine with a 68030/68882 running at 25 mhz will be closer to 4 minutes, while an Amiga 500 with no accelerator card is likely to take an hour or more.

XVII. Saving Your Rendered Pictures

This tutorial assumes that you have just rendered a picture, and that it is still in memory, (ie. You have not exited *Vistapro* since you rendered the picture.) In order to save a picture that you have rendered, you first position the mouse pointer at the top of the screen. Press and hold down the right mouse button. (You must be at the very top of the screen.) You will see the words 'Project', 'Script', and 'Display' in the menu bar at the top of the screen. Still holding the right mouse button down, move the mouse pointer over the word 'Project'. At this time you should see the Project Menu appear. Still holding down the right mouse button, move the mouse pointer down until it is over the 'Save' Menu Item. This should cause another Sub Menu to be displayed to the right. Still holding the right mouse button down, move the mouse pointer to the right, making sure to remain over the word 'Save' while moving, until you reach the 'IFF' Sub Menu Item. When this item is highlighted, (by moving the mouse pointer over it) then you need to release the right mouse button.

Now you should see the *Vistapro* File Requester. It looks like a window with the words 'Save IFF' in the title bar. You will see a box with the word 'Drawer' in it and a black space to the right of it. Below this will be a listing of the files on your disk. To the right of this list, you will see a lighter brown 'drag gadget'. Place the disk on which you want to save your picture into drive DF0: or DF1:, and click once in the black area to the right of the Drawer button. When the green rectangle appears, type the drive id, (DF0: or DF1:) and press the <return> key.

At this point, click once in the black box to the right of the word 'File', and type in the name of the file you would like your picture to be named, and press the <return> key. You will see the 'Busy' mouse pointer while the picture is being saved. You can save your Pictures in a drawer by themselves, and with an extension of '.iff', so you don't get them confused with your landscapes.

XVIII. Viewing Your Saved Pictures

In order to load a Picture File, first position the mouse pointer at the top of the screen. Press and hold down the right mouse button. (You must be at the very top of the screen.) You will see the words 'Project', 'Script', and 'Display' in the menu bar at the top of the screen. Still holding the right mouse button down, move the mouse pointer over the word 'Project'. At this time you should see the Project Menu appear. Still holding down the right mouse button, move the mouse pointer down until it is over the 'Load Landscapes' Menu Item. This should cause another Sub Menu to be displayed to the right. Still holding the right mouse button down, move the mouse pointer to the right, making sure to remain over the word 'Load' while moving, until you reach the 'IFF' Sub Menu Item. When this item is highlighted, (by moving the mouse pointer over it) then you need to release the right mouse button.

Now you should see the *Vistapro* File Requester. It looks like a window with the words 'Load IFF' in the title bar. You will see a box with the word 'Drawer' in it and a black space to the right of it. Below this will

VISTA

be a listing of the files on your disk. To the right of this list, you will see a lighter brown 'drag gadget'. Place the disk on which you have saved your pictures into drive DF0: or DF1:, and click once in the black area to the right of the Drawer button. When the green rectangle appears, type the drive id, (DF0: or DF1:) and press the <return> key. Click on the solid light brown area with the left mouse button and hold it down. By moving the mouse up and down, you should see the contents of the window change. At this point you should see a list of files with the extension '.iff'. You may view this entire list by clicking on the drag gadget to the right and moving it up and down. When you have found the picture that you want to view, click once on the name of that picture, and then click on the 'OK' button.

XIX. Creating and using Animation Scripts

With *Vistapro* you have the ability to do animated fly through's of real and imaginary places. Sitting and rendering each frame could get tedious, especially on a non-accelerated machine, so *Vistapro* provides the ability to run the rendering process by way of a script.

This tutorial assumes that you have loaded or created the landscape that you want to use, and have made any additions to it that you desired. The first thing to do is to create a Script File. In order to create a Script File, first position the mouse pointer at the top of the screen. Press and hold down the right mouse button. (You must be at the very top of the screen.) You will see the words 'Project', 'Script', and 'Display' in the menu bar at the top of the screen. Still holding the right mouse button down, move the mouse pointer over the word 'Script'. At this time you should see the Project Menu appear. Still holding down the right mouse button, move the mouse pointer down until it is over the 'Create' Menu Item. When this item is highlighted, (by moving the mouse pointer over it) then you need to release the right mouse button.

Now you should see the *Vistapro* File Requester. It looks like a window with the words 'Script Name' in the title bar. You will see a box with

the word 'Drawer' in it and a black space to the right of it. Below this will be a listing of the files on your disk. To the right of this list, you will see a lighter brown 'drag gadget'. Place the disk on which you want to save your script file into drive DF0: or DF1:, and click once in the black area to the right of the Drawer button. When the green rectangle appears, type the drive id, (DF0: or DF1:) and press the <return> key. At this point, click in the black square next to the word 'File:', and type the name that you want for your script file. Press the <return> key. Your script file has been created.

The next thing to do is to begin adding frames to your Script File. Position the camera and the target at the position where you want your flight to begin. Select the 'Script, Add' Menu item in the same way that you selected the 'Script, Create' menu item a few minutes ago. Now reposition the camera and target slightly along the path that you plan to take, and repeat the 'Script, Add' function. Keep doing this until you have described a closed path that ends where it began. This will provide for a continuous loop animation. At this point do a test render, mainly to establish a color palette, at least at Polygon size '2', and click on the 'LockP' button in the Middle Control Panel. This locks the color palette, eliminating the flicker in anims caused by the changing of the palette between frames. Select the rendering mode for the anim, (for your first, select lo-res HAM), from the 'Display' menu in the same manner you have made other menu selections during the course of this tutorial. Also select the 'VANIM' selection from the 'Script, Anim Mode' Menu Item. Now, making sure that you have enough disk space, (30K - 40K per frame for lo-res HAM), select the 'Script, Execute' function, and let your machine work until it is finished. This could take 30 minutes to an hour per frame on a non-accelerated machine, and 2 to 5 minutes a frame on a machine with a 68030/68882 running at 25 mhz.

XX. Saving Turbo Silver Objects

This tutorial assumes that you have loaded a landscape, or created your own, and it is currently loaded in *Vistapro*. Also make sure that you have made any color palette changes that you want. Select the Polygon size that you want to export to Turbo Silver, remembering that the smaller the polygon size, the more memory the landscape will require when loaded into Turbo Silver. Now render the image; it is not necessary to select any dithering or shading. When the rendering has passed the Cliff and Color phase, you can click on the 'Abort' button in the Main Lower Control Panel. Now position the mouse pointer at the top of the screen. Press and hold down the right mouse button. (You must be at the very top of the screen.) You will see the words 'Project', 'Script', and 'Display' in the menu bar at the top of the screen. Still holding the right mouse button down, move the mouse pointer over the word 'Project'. At this time you should see the Project Menu appear. Still holding down the right mouse button, move the mouse pointer down until it is over the 'Save Landscapes' Menu Item. This should cause another Sub Menu to be displayed to the right. Still holding the right mouse button down, move the mouse pointer to the right, making sure to remain over the words 'Save Landscape' while moving, until you reach the 'Turbo Silver' Sub Menu Item. When this item is highlighted, (by moving the mouse pointer over it) then you need to release the right mouse button.

Now you should see the *Vistapro* File Requester. It looks like a window with the words 'Save Turbo Silver' in the title bar. You will see a box with the word 'Drawer' in it and a black space to the right of it. Below this will be a listing of the files on your disk. Place a disk in drive DF0: or DF1:, and click once in the black area to the right of the Drawer button. When the green rectangle appears, type the drive id, (DF0: or DF1:) and press the <return> key.

At this point, click once in the black box to the right of the word 'File', and type in the name of the file you would like your Turbo Silver Object File to be named, and press the <return> key.

A grid will appear on the topographic map representing the location of the Turbo Silver objects that Vistapro can save. Move the mouse pointer into the upper left object that you want to be among those saved as Turbo Silver objects and click the left mouse button. Now a 'rubber band' box will appear. Move the mouse pointer until all of the pieces of the landscape that you want saved are covered within the rubber band box, and again click the left mouse button. Vistapro will now save the objects you selected into a Turbo Silver object file.

Index

Symbols

+ 4-1
□ 4-1
24 bit IFF format 3-4
68020 1-2
68030 1-2
68881 1-2
68882 1-2

A

Abort 3-7
Abort button 4-10, 4-11, 4-18, 4-19
About, Landscape submenu 3-9
About, Vista submenu 3-8
Accelerated Amigas 1-2
Accelerator board 1-7
Add 3-10
AddBuffers 7-2
Aesthetics 1-9
AI. See Artificial Intelligence
Airplane 4-5
Aliasing 4-13
Aliasing artifacts 8-9
Anim drawer 3-9
ANIM file generator 3-11
Anim mode 3-11
Anim scripts 3-9
Animation 7-2
Anniversaries 4-23
Apparent roughness 4-15
Arrowhead.scape: 8-6
Art Department 3-4
Artificial Intelligence 1-5, 4-8, 4-9, 4-11, 8-9
Atmospheric occlusion 4-9
Azimuth button 4-26

VISTA

B

- B 6-1
- B(lue) 6-1
- Bank 4-5
- Bare 1-4 6-5
- Base name 3-10
- Beach 6-6
- Beauty of Fractals 8-3
- Benoit Mandelbrot. *See* Mandelbrot, Benoit
- BigSur.scape: 8-7
- Birthdays 4-23
- Blend button 4-17
- Brush 1-4 6-6
- Bullseye 4-25
- BW button 6-3

C

- Caldera 8-9
- Camera 1-1, 1-5, 3-9, 4-2, 4-3, 4-4, 4-5, 4-9, 4-16, 4-21, 6-7
- Camera altitude 1-9
- Chaotic math 1-5
- CLI 3-6
- CLI or Shell 1-4
- Cliff 4-8, 5-2
- Cliff 1-4 6-5
- Cliff colors 5-2
- Coarseness of the landscape 4-14
- Color 1-1, 5-2. *See also* Colors
- Color bands 4-14
- Color Control Panel 3-14, 4-12, 6-1
- Color palette 6-2
- Color ranges 6-2
- Color saturation 4-17
- Coloring 5-5
- Colormap 3-5, 3-6, 3-8
- Colors 6-2, 6-5
- Contrast 6-7
- Control Panel 4-1, 4-4, 4-10
- Copies 2-1
- Copy button 6-4
- CraterLake.scape: 8-5
- Create 3-10

Custom button 4-25
Custom light source 4-25

D

D. Saupe 8-3
Declin button 4-26
DEM 1-4, 3-6, 8-9. *See also* Digital Elevation Model
DEM Format 1-3
DEM polygons 5-4
DEM, Vista 3-6
Digi Paint 8-9
DigiPaint 3 3-4
Digital Elevation Model 1-1, 1-4, 8-9. *See also* DEM
Disk buffers 7-2
Disk storage space 4-22
Display Menu 3-1, 3-13, 4-1, 4-18
Dithering 4-18, 8-10
Dithering, pixel 3-13
Dithr button 4-14
Dithr string gadget 4-14
dR 4-4
dX 4-4
dY 4-5
dZ 4-5

E

ElCap.scape: 8-4
Elevation 6-2
Erosion 1-9
Exager 4-25
Exaggerated shading 4-25
Exaggeration button 4-25
Execute 3-10
Execute program 3-11
Exploration 1-10
Exposure 6-7
Extended DEM 3-8

F

F stop 6-7
Faded 6-2
Fat Poly artifacts 4-20

VISTA

- Fat Polys 1-8, 4-20, 8-10
- File protection 1-3
- File requester 3-1, 3-9
- Fingerprints 4-23
- Firecracker 24 3-4
- Floating mode 4-23
- Floppy System 2-1
- Force reshading 5-5
- Frac button 4-16
- Fractal 8-10. *See also* Fractals
- Fractal Dimension 4-23
- Fractal geometry 8-1
- Fractal Geometry of Nature 8-1, 8-3
- Fractal landscapes 1-4, 4-23, 5-2
- Fractal Lower Control Panel 4-16, 4-22
- Fractal music 6-4
- Fractal Pro 8-1, 8-10
- Fractalize existing landscapes 4-24
- Fractals 8-1. *See also* Fractal
- Frame Buffer 3-4
- Frctlz 4-24
- FrDim button 4-23
- Fuzziness 4-14
- Fuzzy 6-2

G

- G 6-1
- G(reen) 6-1
- General Information 2-4
- Generate 5-2
- Generation of a new picture 4-18
- Geology 1-9
- Getting Started 2-1
- Glossary 8-9
- Gouraud shading 1-9, 4-17
- Gray shade 6-3
- Ground cover 4-8
- Gshade 4-17

H

- H. Peitgen 8-3
- HalfDome.scape: 8-4

- HAM 3-4, 3-13, 4-13, 4-18, 7-2, 8-10
- HAM artifacting 4-18
- HAM mode 5-5
- HAM-E board 3-4
- Hard Disk 2-3
- Hard Disk Installation 2-3
- Haze 6-3, 6-5, 6-7, 8-10
- Haze button 4-9
- Head 4-6
- Hi Res mode 3-14
- Hi-res 3-4, 3-13
- Hi-Res Menu Item 4-18
- Hi-res mode 5-5
- Hilbert curves 8-2
- Hold and Modify 3-13
- Holidays 4-23
- Horizon 4-25
- Horizon function 5-3
- Human vision 4-20

I

- IFF 3-3, 3-4, 3-11, 8-11
- IFF 24 3-3, 3-4, 3-11
- Installation 2-1, 2-3
- Interlace 3-4, 3-14, 7-2
- Island mode 4-23

J

- Jaggies 1-8, 8-11
- Julia.scape: 8-6

K

- Koch snowflakes 8-2

L

- Lake 4-7
- Lake Generation 4-10, 4-19
- Landscapes 1-3, 3-5, 8-4
- Lens button 4-16
- Lens Lower Control Panel 4-16, 4-20
- Light button 4-16, 5-5

VISTA

- Light Lower Control Panel 4-16, 4-24
- Light source 4-26
- Light source direction 4-24
- Lighting 1-7
- Limits 1-4
- Lo-res 3-13, 4-13
- Lo-res mode 3-14, 5-5
- Load 3-2
- Load IFF 3-3
- Load, IFF 24 3-3, 4-18
- Load Landscape 3-5
- Loading from the CLI or a Shell 1-4
- Locking Functions 4-3, 4-4
- LockP button 4-13
- Lower color 6-4
- Lower Control Panel 4-1
- Lower Control Panels 4-16

M

- Main button 4-16
- Main Lower Control Panel 4-16, 4-17
- MakeAnim program 3-12
- Mandelbrot, Benoit 8-1, 8-3
- Mandelbrot.scape: 8-6
- Mars 1-10
- Math co-processor 1-2
- MegageM 8-1
- Menus 3-1
- Middle Control Panel 4-1, 4-7
- Mimetics framebuffer 3-5, 3-11
- Mons.scape: 8-6
- MorroBay.scape: 8-8
- MSHA.scape: 8-5
- MSHB.scape: 8-5
- MtAdams.scape: 8-8
- MtBaldy.scape: 8-8
- Multiple Drive System 2-2

N

Navigation 4-26
Negative numbers 4-22
NESW 4-25
Non-interlace mode 3-14

O

Object colors 5-2
Ocean 6-3, 6-6
OK button 6-1, 6-3
Olympus Mons 8-11
One Drive Systems 2-1
Open 3-10
Overscan 3-4, 3-13, 3-14, 7-2

P

P. Richter 8-3
Palet button 4-1, 4-12
Palette 3-14
Palette Menu 4-1
Palette selection 6-1
PDthr 4-18
Peano curves 8-2
Peitgen, H. 8-3
Pitch 4-6, 4-26
Pixel, dithering 3-13, 4-18
Plate tectonics 1-9
Pointer 4-2
Poly 4-14
Polygon size function 4-14
Polygon sizes 5-5
Polygons 4-14, 4-17, 4-20, 8-11
Preview 3-10
Print 3-8
Project Menu 3-1
Protect 3-6

Q

Quit 3-9
Quit button 6-4

VISTA

R

- R 6-1
- R(ed) 6-1
- R(ed) G(reen) B(lue) sliders 6-1
- Random dithering 6-2
- Random Landscape Generation 4-22
- Random seed 4-23
- Ray Tracing 8-11
- Real screen 5-4
- Recorder 3-5
- Recreate a desired landscape 4-22
- Redraw button 4-18
- Reflected light 5-3
- Renaming 2-3
- Renaming Working Copy 2-3
- Render 4-18, 5-4
- Rendering function 4-19
- RGB 3-5, 3-11
- Richter, P. 8-3
- River 4-7, 4-11, 6-3
- River Generation 4-10, 4-19
- Rotational angle of camera 4-5, 4-6
- Rough button 4-15
- Rough string gadget 4-15
- Roughness of the terrain 4-23

S

- SanGorgonio.scape: 8-7
- SanLuisObispo.scape: 8-7
- Saupe, D. 8-3
- Save 3-4
- Save IFF 3-4
- Save, IFF 24 3-4
- Save Landscape 3-6, 3-7, 4-22
- Save, RGB 3-5
- Scaling special effects 4-15
- Scan lines 3-14
- Science of Fractal Images 8-3
- Screen 5-5
- Script 3-10
- Script Menu 3-1, 3-9
- Sculpt-Animate 4D 3-5

- Sea 4-7
- SEA function 4-23
- Sea level 5-2
- Shade function 5-3
- Shaded 6-2
- Shading 5-5
- Shadow button 4-12
- Shadows 4-25
- Shell 3-6
- Single frame 3-5
- Single frame generator 1-5
- Single-frame recorder 3-5
- Sky 6-5
- Sky Color 6-3
- Sky function 5-3
- Sky Haze 6-3, 6-5, 6-7
- Sliders, R(ed) G(reen) B(lue) 6-1
- Smooth 4-11
- Snow 4-8
- Snow 1-4 6-5
- Snow button 4-9
- Snow color 4-9
- Snow level 4-9
- Snow line 1-8, 5-2
- Sound 6-4
- South 4-26
- Speeding Up Vistapro 1-6
- Spread function 6-4
- Stack requirements 1-3
- Stars 4-13
- Stars button 4-13
- Status window 4-18, 5-2
- String gadgets 1-2, 4-8, 4-9
- Sun 4-25
- Sundown effect 4-13

T

- Target 1-1, 3-9, 4-2, 4-4, 4-5, 4-9, 4-21
- Test renderings 4-14
- Timber line 4-8
- Title bar 3-1
- Topography 8-12
- Topology 8-12

VISTA

- Tree 4-8
- Tree line 1-8, 5-2
- Turbo Silver 1-5, 1-9, 3-7, 8-12
- Turbo Silver Object files 3-6
- Turbo Silver Objects 3-7
- Tutorials, Vistapro 9-1

U

- United States Geologic Survey (USGS) 1-5, 8-12
- Upper color 6-4
- Upper Control Panel 4-1, 4-2
- USGS. *See* United States Geologic Survey (USGS)

V

- VANIM 3-11, 7-1, 7-2
- Vantage.scape: 8-7
- Vertical scale 4-15
- Video Toaster 3-4
- View button 4-19
- View screen 4-18
- Viewer 7-1
- Virtual image 5-5
- Virtual reality 1-7, 1-9, 1-10
- Virtual screen 5-4
- Vista Control Panel 6-4
- Vista DEM 3-6, 3-7
- Vista status window 4-18, 5-1
- Vistapro file requester 3-9
- Vistapro Tutorials 9-1
- Vistapro.881 1-2

W

- Water 1-4 6-6
- Water 5 - Waterfalls 6-6
- Waterfalls 6-3, 6-6
- Waves button 4-12
- Wide 4-20
- Wide angle lens 4-20, 4-21
- Wolf, Daniel Ph.D. 8-1
- WoodSh.scape: 8-8
- Working Copies 2-1, 2-3

X

X, Y and Z locks 4-4

X, Y and Z value windows 4-3

X, Y, Z 1-1, 5-2

XYZ Coordinates 5-2, 8-12

Z

Zoom 1-8

Zoom lens 4-20, 4-21

✦✦✦ Vista*pro* Notes ✦✦✦

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